BLOW AWAY THE BLUES:

THE DEVELOPMENT AND PREVENTION OF DEPRESSIVE SYMPTOMS AND NEGATIVE COGNITIONS IN YOUNG ADOLESCENTS

Karlijn Kindt

Behavioural
Science
Institute

BLOW AWAY THE BLUES:

THE DEVELOPMENT AND PREVENTION OF DEPRESSIVE SYMPTOMS AND NEGATIVE COGNITIONS IN YOUNG ADOLESCENTS

Karlijn Kindt

Colofon

The studies described in this thesis were funded by ZonMw
(project number 80-82470-98-006).

ISBN
978-94-028-0151-4

Illustrations
Albert Hennipman, De Ruimte Ontwerpers, Utrecht

Design/lay-out
Promotie In Zicht, Arnhem

Print
Ipskamp Printing, Enschede

BLOW AWAY THE BLUES:

THE DEVELOPMENT AND PREVENTION OF DEPRESSIVE SYMPTOMS AND NEGATIVE COGNITIONS IN YOUNG ADOLESCENTS

Proefschrift

ter verkrijging van de graad van doctor
aan de Radboud Universiteit Nijmegen
op gezag van de rector magnificus,
volgens besluit van het college van decanen
in het openbaar te verdedigen op vrijdag 20 mei 2016
om 12.30 uur precies

door

Karlijn Christiana Mathilde Kindt
geboren op 22 oktober 1983
te Axel

Promotoren
Prof. dr. J. M. A. M. Janssens
Prof. dr. R. H. J. Scholte

Copromotor
Dr. M. Kleinjan

Manuscriptcommissie
Prof. dr. C. L. M. Witteman
Prof. dr. J. de Vries (Tilburg University)
Prof. dr. P. H. Silverstone (University of Alberta, Canada)
Dr. H. van 't Land (Trimbos-instituut)
Dr. M. H. Nauta (Rijksuniversiteit Groningen)

Contents

1
INTRODUCTION

Depression: Scope of the problem

Definition

Imagine a girl of 14 years old. She is alone in her room and sits behind her desk, trying to do her homework. Her shoulders are bent down. Because her thoughts keep on distracting her, she stands up, walks to her bed and starts writing in her diary: "Dear Diary, I just feel I am not smart enough to do my homework. I am probably the dumbest girl in school. It feels like I cannot do anything right. I cancelled the appointment with my friend this evening, I won't be nice company anyway. I guess she won't even miss me. And mom and dad, they complain I respond so irritable the last weeks. Where is the energy I used to have? I don't want to do anything for weeks now. Just lay in my bed. Life would be better if I would not have to wake up again."

Individuals who experience a major depressive episode may feel, think and behave like this 14-years old girl. The characteristics of depression are described in a similar manner in the two main classification systems; the American Diagnostic and Statistical manual of Mental disorders 5 (DSM-5) and the International Classification of Diseases, tenth version (ICD-10). Depression is described as a cluster of symptoms, in which a distinction is made between core symptoms and associated symptoms. The three core symptoms of a depressive episode are a depressed mood (1), loss of interest in activities or pleasurable feelings (2), and decreased energy or increased susceptibility to fatigue (3). The associated symptoms are loss of confidence or self-esteem, unreasonable ideas of guilt or worthlessness, recurrent thoughts of death or suicide, diminished ability to think or concentrate, change in psychomotor activity or agitation, sleep disturbance and change in appetite and corresponding change in weight. The number and severity of the symptoms determine whether the depressive episode is specified as mild, moderate or severe. The diagnostic criteria are applicable for each age group, yet, the DSM-5 specifies for children and adolescents that an irritable rather than a depressed mood is allowed as a core symptom (APA, 2014).

Prevalence

The findings of an international meta-analysis reveal that the prevalence of depression diagnoses is 2.8% in children under age 13, and 5.6% in those between 13 and 18 years (Costello, Erkanli, & Angold, 2006). After a strong increase in adolescence (Hankin et al., 1998), the prevalence stabilizes in adulthood. Both international and Dutch studies showed that almost 21% of the adults reported a lifetime prevalence depressive episode (De Graaf, Ten Have, Van Gool, & Dorsselaer, 2012; Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012) and 8.6% reported a 12-month prevalence (Kessler et al., 2012). For adolescents in the Netherlands, the 12-month prevalence of a depressive disorder has been estimated at 4% (almost 37.000 individuals), and 20% reported to suffer from a depressed mood (Meijer, Smit, Schoemaker, & Cuijpers, 2006). A recent survey among

Dutch adolescents revealed that the proportion of adolescents with emotional problems increases with age: 16.5% of 12-years old reported to have emotional problems, compared to 21.6% of 16-years old (De Looze et al., 2014).

Although the prevalence of depression is equal for boys and girls in childhood, the prevalence rates rise stronger in girls than in boys during adolescence (Twenge & Nolen-Hoeksema, 2002). Among 13- to 17- year olds in the USA, 9% of the boys, and 17% of the girls reported to have experienced a depressive episode (Kessler et al., 2012). This difference between boys and girls also seems to emerge in the Netherlands, as 9.4% of the adolescent boys reported emotional problems in contrast to the higher proportion of 31% of the girls reporting emotional problems (Looze et al., 2014). More specific, the Netherlands Statistics (Centraal Bureau Statistiek, CBS) showed that among 12- to 16- year olds, 7.5% of the boys, and 9.3% of the girls have experienced depressive symptoms. These numbers increase in the age-group of 16- to 20- year olds, in which 17.3% of boys, and 22.7% of girls reported depressive symptoms (Gezondheidsenquete 2013, CBS). Also recurrence of depression is common in adolescence and adulthood (Lewinsohn, Rohde, Seeley, Klein, & Gotlib, 2000), and most adults with a depressive disorder have had their first depressive episode before they were 18 years old (Kim-Cohen, 2003). As such, depression in adolescence is an important public health concern.

Consequences

Depression has several negative consequences on the short and long term. On the short term, adolescent depression is associated with educational underachievement, binge eating, increased risk for substance use and smoking, and suicidal ideation and suicide (Birmaher et al., 1996; Evans, Hawton, & Rodham, 2004; Fergusson & Woodward, 2002; Glied & Pine, 2002). While the risk of these short-term negative outcomes may be raised by depression, the outcomes themselves may also reinforce and perpetuate adolescents to be at risk of depression. For example, adolescents with educational underachievement may in turn develop more negative cognitions about themselves, a negative affect and depressive symptoms (Hankin & Abramson, 2001). On the long term, depressive adolescents are at risk for unemployment, early parenthood (Fergusson & Woodward, 2002) and a higher dissatisfaction in later marriage (Gotlib, Lewinsohn, & Seeley, 1998). Moreover, although little information is available about the economic consequences of depression in adolescence (Lynch & Clarke, 2006), the consequences of mood disorders are estimated to cost yearly 5,009 euro's per depressed adult and 311 million Euros per 1 million inhabitants in the Netherlands (Smit et al., 2006). At the population level, a substantial part of the societal costs are caused by new incidence (Smit et al., 2006). Extending the knowledge about how to prevent adolescents to suffer from depression is thus an important challenge that could improve mental health care and reduce negative consequences of depression on the short and long term.

Theories about the causes of depression

Although finding depressive symptoms in adolescence is more common than in childhood (Hankin et al., 1998) and will not yet result in the diagnosis of a depressive episode, also subsyndromal symptoms of depression pose a significant risk for functional impairment (Brent, Birmaher, Kolko, Baugher, & Bridge, 2001) and are a precursor of a major depressive episode (Birmaher, Arbelaez & Brent, 2002). Several risk factors have been found to contribute to the development of depressive symptoms. Risk factors can be organized by genetic and early familial risks, brain and neuro-endocrine mechanisms, gene-environment interplays and psychosocial risk factors (Thapar, Collishaw, Pine, & Thapar, 2012). With regard to the first, both genes and non-inherited factors contribute to the risk that offspring of parents with a depressive disorder show increased depression rates (Kendler, Gatz, Gardner, & Pedersen, 2006; Rice, Harold, & Thapar, 2002; Weissman, Warner, Wickramaratne, Moreau, & Olfson, 1997). For major depression, the heritability lays around 40-50% (Bierut et al., 1999; Franić, Middeldorp, Dolan, Ligthart, & Boomsma, 2010; Kendler, Gardner, Neale, & Prescott, 2001; Sullivan, Neale, & Kendler, 2000). This could mean that in most cases of depression, around 50% of the cause is genetic, and around 50% is unrelated to genes (such as psychological or physical factors). Familial risk, for instance, comprises parent-child interaction patterns and parental rearing strategies. The amount of care, control, support and conflict are aspects of parent-child interaction that predict increases in depressive symptoms and the first onset of depressive disorders (Restifo & Bögels, 2009). With regard to the brain and neuroendocrine mechanisms, the hypothalamic–pituitary–adrenal (HPA) axis is found to be dysregulated in depressed youth and adults, as it gives an overactive response to psychosocial challenges, which in turn make individuals more vulnerable for depressive symptoms (Lopez-Duran, Kovacs, & George, 2009; Burke, Davis, Otte, & Mohr, 2005). With regard to the gene-environment, for example, research suggests that a serotonin transporter gene variant may be involved with an increased sensitivity to adversity and subsequently make individuals more vulnerable to develop depression following stressful life events (Uher & McGuffin, 2010). Since the genetic and physical dispositions described above might be harder to change or target by means of prevention and intervention efforts, it is also important to focus on factors that are more changeable. In this dissertation, we will therefore focus on psychosocial risk factors. We will focus on individual characteristics, and not on familial factors, because these are less complex and have more opportunities to be influenced by prevention efforts on large scale. More precisely, we will focus on a cognitive model of depression, as this seems to be influential when it comes to investigating the mechanisms through which depression occurs.

Cognitive theories

Beck's Cognitive Theory (Beck, Rush, Shaw, & Emery, 1979) and The Hopelessness theory (Abramson et al., 1989) are two important theories that are widely used in present-day research and provide the foundation for current depression interventions in clinical practice. Beck's Cognitive Theory (Beck et al., 1979) states that people are vulnerable to develop depressive symptoms when they are confronted with a negative life event, which can activate dysfunctional negative beliefs about the world, others and the self. The Hopelessness theory is an adapted version of the earlier formulated Helplessness theory (Seligman, 1978) in which thoughts about the *cause* of highly desired or highly aversive events are hypothesized to be a predictor to depression. While the Helplessness theory solely focused on cognitions about the cause of an event (e.g. a bad degree at school is one's own fault), later researchers argued that also inferences about the fact that the event happened play an evitable role (Abramson et al., 1989). In the Hopelessness theory, in addition to cognitions about causes, inferences about the self (e.g. due to a bad degree I am worthless) and about consequences (e.g. due to a bad degree I will fail this school year) are described to evoke the experience of hopelessness and by consequence depressive symptoms (Abramson et al., 1989). Furthermore, cognitions about the cause of an event are differentiated in internal versus external (i.e. caused by oneself or by somebody/something else), stable versus temporary (i.e. the cause remains or changes over time) and global versus specific (i.e. the cause will also influence other situations or solely a specific situation). To illustrate, the 14-year old girl from the introduction had a negative *internal* attribution about the cause of the fact that she struggled with her homework ('*I* am not smart enough to do my homework') and the event evoked also negative cognitions about her *self* ('I am a dumb person'). Adolescents that have these negative cognitions may develop a negative cognitive style, which in turn will make them vulnerable to develop depressive symptoms or depression (Abramson et al., 1989; Beck et al., 1979).

Strong empirical support for these cognitive theories has been found in meta-analytic reviews that included studies with a cross-sectional design that examined whether the statistical interaction between a negative cognitive style and negative life events was associated with higher levels of depressive symptoms (Gladstone & Kaslow, 1995; Joiner & Wagner, 1995). Yet, as these meta-analyses were based upon cross-sectional studies, they were unable to conclude whether a negative cognitive style – with or without interacting with negative life events - temporally preceded depression over time. A more recent review analyzing 20 longitudinal studies among 13-to-19-years-olds demonstrated that a negative cognitive style, in interaction with negative life events, predicted an increase in depressive symptoms with a moderate partial correlation of 0.22 (Lakdawalla, Hankin, & Mermelstein, 2007). In the last decade, longitudinal studies on children and young adolescents showed that a negative cognitive style predicted depressive symptoms, also irrespective of the presence of negative life events (Abela & Hankin, 2011; Brozina & Abela, 2006; Calvete, Villardón, & Estévez, 2008; Cole et al., 2008; Cole et al., 2011; Hankin, 2008b).

Overall, empirical evidence provide support for cognitive theories to -partly- explain the cause of depressive symptoms in adolescents. Hence, an effective strategy to prevent adolescents to develop depressive symptoms may be by using depression prevention programs based on the cognitive theory.

Central themes of this thesis

The first part of this thesis is focused on depression prevention. Insight will be given into the effectiveness of the universal school-based depression prevention program 'Op Volle Kracht', which is based on cognitive behavioral theory. The second part will focus on the mutual development of depressive symptoms and a negative cognitive style over time, and the effect of negative life events on this longitudinal relationship.

Part I: Effectiveness of a depression prevention program

Depression prevention

Because individuals with a depressive disorder often have their first depressive episode in adolescence (Kim-Cohen, 20013) and the likelihood of the recurrence of symptoms is substantial once a person has experienced a depressive episode (Lewinsohn et al., 2000), it is pivotal to *prevent* adolescents from developing depressive symptoms which may lead to a decrease of incidents of depression in adulthood. Prevention of mental disorders such as a depression needs to be integrated within a public policy approach at local and national levels (Saxena, Jané-Llopis, & Hosman, 2006). Generally, three levels of depression prevention efforts are distinguished: universal, selective and indicated prevention (Muñoz, Cuijpers, Smit, Barrera, & Leykin, 2010). Universal prevention targets entire populations and has the advantage that all possible vulnerable individuals are reached, yet, many adolescents that do not need a depression prevention program are also involved and this will lower (cost-) effectiveness. Indicated prevention stands on the other side of the prevention continuum and targets individuals that are screened and found to have elevated depression symptoms but not as severe that symptoms meet the criteria of a disorder. Although an indicated approach has the advantage of showing a higher effectiveness than a universal approach (Horowitz & Garber, 2006; Stice, Shaw, Bohon, Marti, & Rohde, 2009), screening efforts reduce cost-effectiveness and make implementation more difficult. Moreover, indicated prevention approaches could also lead to stigmatization of the subgroup that will be offered a program. In selective prevention, standing in between universal and indicated prevention on the prevention continuum, screening is not necessarily needed because natural existing subgroups that are known to have an increased risk to develop depressive symptoms are targeted. As such, for selective prevention the (cost-) effectiveness is expected to be higher compared to a universal approach, and the implementation is less complex compared to indicated prevention.

Worldwide, several group depression prevention programs have been developed to impede adolescent depression. A meta-analytic review (Merry et al., 2012) analyzed fifty-three studies including 14,406 participants that participated in universal or targeted (i.e. selective or indicated) prevention programs (e.g. Coping With Depression Course [Clarke, Rohde, Lewinsohn, Hops, & Seeley 1999]; Penn Resiliency Program [Gillham, Hamilton, Freres, Patton & Gallop, 2006]; LISA-T [Possel, Horn, Groen & Hautzinger, 2004]). Despite previous criticism that universal preventive efforts for adolescent depression is ineffective (Merry, 2007), a meta-analytic review (Merry et al., 2012) found that depressive disorders were reduced immediately after an intervention (Risk Difference (RD) = -0.09), at three to nine months follow-up (RD = -0.11), and at 12 months follow-up (RD = -0.06). These findings are in line with a previously published meta-analytic review on depression prevention programs which revealed small effect sizes on average from pre- tot posttest (r = 0.15) and from pretreatment to follow-up (r = 0.11; Stice et al., 2009). Moreover, although research on cost-effectiveness of depression prevention in adolescents is scarce, a possible cost offset is suggested for an effective preventive intervention compared with usual care for one year after the intervention (Lynch et al., 2005), but not for an ineffective school-based depression prevention program (Anderson et al., 2014).

While the meta-analytic reviews concluded that universal and targeted prevention programs have small effects in general, the results vary over the different programs and trials. To investigate why these results differed, Stice and colleagues (2009) investigated potentially relevant moderators, including the content of the interventions, choice of providers and participant characteristics. With respect of the content of the interventions, most of the programs used cognitive behavioral techniques and taught adolescents to monitor their thoughts, to evaluate whether these thoughts are helpful and realistic, and to change their thoughts into more positive thoughts when useful. Also, problem solving skills, social skills, and behavioral activation by stimulating engagement in pleasant activities were included in many of the depression prevention programs. Findings showed that the content components (e.g. cognitive restructuring, problem solving strategies, social skills training or behavioral activation) did not predict the effect size. Concerning the providers, no difference was found for the effects at post-treatment between psychologists and teachers, but differences emerged for follow-ups in the advantage of the psychologists. With respect to the participants, the effect sizes were larger for samples with more females, samples with older adolescents, and samples targeting high-risk youth.

The development of a Dutch depression prevention program: Op Volle Kracht

So far, there are little group depression prevention programs for adolescents available or used in the Netherlands, especially not any which are solidly tested on effectiveness (see Table 1 for an overview). Motivated by a policy document of the Dutch Ministry of Health, Welfare and Sport in 2006, in which depression prevention was prioritized (Ministerie

VWS, 2006), and by recommendation of the national steering committee for guidelines for mental health on depression (Stuurgroep Multidisciplinaire Richtlijnontwikkeling GGZ, 2009), a team of researchers and prevention developers initiated the development of a Dutch depression prevention program.

Penn Resiliency Program

The Penn Resiliency Program (PRP; Gillham et al., 2007) was selected from existing depression prevention programs to be translated and adapted to the Dutch situation because it was a well-examined, theory-based program that had shown to be effective in universal, selective and indicated studies in a school-setting based upon trials in the USA, Australia, England, Scotland and China (Brunwasser, Gillham & Kim, 2009). A review on 17 effectiveness trials on PRP that included 2,498 adolescents showed fewer depressive symptoms at post-treatment, at six-to-eight, and at 12 months follow-up assessments compared with no intervention. The effect sizes ranged from 0.11 to 0.21 and the effects were significant for participants with both low and elevated depressive symptoms, for boys and girls, and when the program was provided by members of the research team (e.g. program developers and clinical psychologists) and by professionals from the community (e.g. trained teachers).

PRP is largely based on cognitive behavioral therapy and was designed for early adolescents (10-14 years). PRP intends to make abstract cognitive-behavioral concepts accessible and relevant to young adolescents (Gillham, Brunwasser, & Freres, 2008). First, a conceptual framework for each technique is established, for example by role-plays or cartoons. Then, the group practices the skills with hypothetical scenarios, and subsequently the adolescents are encouraged to use the skills in personal real-life situations. The main components are cognitive restructuring and social problem solving, which are taught in twelve 90- to 120-minute sessions in a school setting.

The cognitive component starts with teaching adolescents to recognize problematic situations, their beliefs about that situation, their emotions and their intensity, and the link between situations, beliefs and emotions. By role-playing, it is illustrated that within a similar situation, specific thoughts elicit specific emotions. Next, adolescents learn about cognitive styles and that these styles can precipitate negative emotions and non-constructive behavioral consequences ('self-full-filling prophecy'). Not only an optimistic cognitive style is promoted because it leads to effective problem solving skills, also accuracy of thoughts is emphasized to prevent adolescents from developing blind optimism. Adolescents are encouraged to challenge a negative cognitive style (i.e. cognitive restructuring) by searching for evidence, formulating alternative thoughts, and putting their catastrophic thoughts into perspective. At last, it is practiced how to stop the negative cognitions rapidly in the moment as they occur.

The social-problem-solving component includes techniques to improve assertiveness, relaxation and dealing with problems. For teaching assertiveness, three skits are used to

Table 1 Overview of Group Depression Prevention Programs Available in the Netherlands.

Intervention # author, year	**Theory/components**	**Age range** **(M=mean age)**
Doepressie cursus*	CBT, mood monitoring, improving social skills, increase pleasant activities	16-21
# Clarke et al., 1999 (Adolescent Coping With Depression Course)		M=16
Stemmingmakerij	CBT, goal setting, problem-solving, praise (social support), self-reward,	15 -19
# Ruiter, 1997		
# VMBO-versie: Goede tijden slechte tijden		12-14
Grip op je dip online	CBT, relapse prevention, Social support	16 - 25
# Van der Zanden et al., 2012		M=18
Happyles	CBT, positive psychology	13 - 25
# Van der zanden et al., 2013		
Headup *	CBT, assertiveness training, dealing with conflicts, goal setting	13-17
#Clark e.a. 1995 (Coping with stress course)		
#Clark e.a. 2001 (Coping with stress course)		
Pak aan	CBT, problem-solving, social support	9-13
# De Cuyper et al., 2004		10-12
Praten online	Solution focused technique, Problem solving, goal setting, Therapist praise	12 - 22
# Kramer et al., 2014		18 - 22
Vrienden*	Cognitive therapy, relaxation skills, self-monitoring, self-reward, coping skills, problem-solving skills	8 - 16
# Barrett et al., 2006		10-14
# Kosters, Chinapaw, Zwaanswijk e.a. 2012 (studyprotocol)		10-12

Note: * = no Dutch studies available. RCT = Randomized Controlled Trial, I = Intervention, WL = Waitlist, CAU = Care As Usual, A = Adolescent intervention, P = Parent intervention

Setting	Study design	Effect on depressive symptoms
Health care setting		
	RCT: A vs A+P vs WL	Recovery rates at Post treatment: A 69%, A+P 67%, WL 48%. Cohen's h = 0.38
Health care setting, Schools		
	Quasi experimental	At 12 months follow-up lower depressive symptoms in intervention (Cohen's d=1,6) and control group (Cohen's d=0,5)
online		
	RCT: I vs WL	Betweengroup effectsize Cohen's d=0.94, effective up to 6 months after intervention
School + online		
	pre- posttest design	Not significant for total group. Significant for (sub-)clinical depressive youth t=4,6 (df = 82); p<0.001.
Health care setting, school		
	RCT: I vs CAU	Post-treatment: Significant decrease depressive symptoms (F[1,113]=3.91; one teailed, p<.05). At Follow-up non significant.
	RCT: I vs CAU	FU: 9,3% of exp. group had developed a depressive disorder, versus 28,8% in controlegroup: (p<.01)
Health care setting		
	RCT: I vs WL	Effective at 4 months after treatment F[1,14]=4.69, p< 0.05
online		
	RCT: I vs WL	Effective at 9 weeks and 4,5 months after baseline
Health care setting, school		
Schools	RCT: I vs CAU	Not significant
Schools	RCT: I vs WL	No results yet

illustrate passiveness, aggressiveness and assertiveness. Subsequently, an assertive reaction is practiced by a four-steps plan, and negative cognitions that may deter an assertive approach are discussed. Relaxation is taught to use in uncontrollable situations in which strong emotions are felt. A variety of skills are used: progressive muscle relaxation, deep breathing and positive imagery. The final skill is a five-step-approach for problem solving based on Crick and Dodge's social-information-processing model (1996).

Op Volle Kracht

In April 2010, a team of 11 Dutch professionals, [five researchers from the Radboud University, two prevention developers from municipal health services (GGD), two employees from the national institute on mental health and addiction (Trimbos-institute), and two psychologists with a clinical degree], went to Philadelphia and were extensively trained by the developers of the PRP program. The Dutch depression prevention program Op Volle Kracht (OVK) was derived from the PRP program by translating the program, adapting examples to the Dutch situation, updating the lay-out and adapting the arrangement of chapters to fit in the 45- to 50-minute lessons of the Dutch school system. The first version was piloted with two small groups of adolescents, whose comments were evaluated and led to the last adaptations of the program before printing the workbooks for adolescents. The final version of OVK was ready in January 2011. OVK covers 16 lessons of which the first eight lessons focus on CBT and the last eight lessons on social and coping skills. See Table 2 for a summary of the content of OVK. In the CBT-part, similar as in PRP, adolescents are first taught to recognize their emotions, then to identify events that triggered the emotions, and subsequently what their cognitive interpretations were of the identified events. The adolescents were challenged whether restructuring their cognitions would be more helpful and would lead to a more positive or less negative emotion. We therefore taught them to recognize three commonly used 'thinking traps' (i.e. examples of a negative cognitive style) and corresponding techniques how to challenge these negative cognitions as was also done in PRP. The thinking traps were: Always Me-thoughts (i.e. attributing the cause of a negative event to oneself and as long lasting), Negative Selection (i.e. focusing on things that went wrong) and Catastrophizing (i.e. assuming something will go wrong without having evidence for that). In the second part, coping skills such as relaxation, seeking help and distraction were taught for situations in which cognitive restructuring was not useful. Also realistic goal setting, how to make decisions and to overcome procrastination were included. Also similar as in PRP, social and communication skills were trained by role-playing and comprised skills how to approach and interact with peers. To keep the program accessible for a broad group of adolescents, the examples of events consisted of daily hassles, such as an angry teacher or not being invited for a party, and did not focus on major life events.

Table 2 Content and Goals of the OVK Sessions.

Session 1
Introduction of OVK, building group cohesion, practice to describe recent activating events.
Session 2
Identifying basic emotions, physical expression and bodily experiences that accompany emotions, and the diversity in intensity. Different people may experience differences in emotions while facing a similar event.
Session 3
Identifying thoughts, which are introduced as 'conversations in your head'. Linking events with thoughts and emotions. Learn to differentiate between pessimistic and optimistic thoughts.
Session 4
Introduction to three often used 'thinking traps' ('pessimism', 'catastrophizing' and 'always-me thoughts'). Practice to identify the thinking traps and to generate other, more positive alternative thoughts that elicit a more positive or a less negative emotion.
Session 5
Rehearsal of previous sessions. And introduction of a skill to evaluate the accuracy of thoughts: Looking for evidence.
Session 6
Practices on how to look for alternative and more positive thoughts: Generating alternatives.
Session 7
Introduction of a skill to evaluate negative thoughts about the future (i.e. 'catastrophizing'): Putting it into perspective, which involves describing the worst case, best case and most likely scenario. And introduction of the 'hot seat', which requires the adolescents to use the three learned cognitive skills (generating alternatives, producing counter-evidence and putting it into perspective) in real time.
Session 8
Rehearsal of session 5, 6 and 7. And practicing with the 'hot seat'.
Session 9
Social skills training. Role-playing is used in which the adolescent experiences differences in posture, eye contact, distance to the other and volume of the voice while making contact with others. Negative thoughts that may restrain to make contact with new people are challenged. And practicing with the 'hot seat'.
Session 10
Interpersonal problem solving skills training. Skits are used to illustrate three interaction styles: aggression, passivity and assertiveness, and the consequences these styles will have. Further, adolescents practice to use the four steps of negotiation when assertiveness fails to bring about the desired goal.
Session 11
Dealing with situation that you cannot control. Coping strategies such as controlled breathing, muscle relaxation and using positive visual imagination are practiced. Also other strategies are discussed, such as seeking social support, distraction, leaving a stressful situation, and mind games.

Table 2 Continued.

Session 12
Rehearsal of session 9, 10 and 11. And practicing with the 'hot seat'.
Session 13
Dealing with procrastination. Thoughts that lead to procrastination are discussed. Adolescents practice how to divide a comprehensive task in parts and how to reward themselves. Simple tricks what helps to take a first step are discussed.
Session 14
Decision making. Adolescents are taught to use a four-cell technique for decision making, in which they generate the pros and cons for two possible outcomes in a fictive situation, and a personal chosen situation.
Session 15
Social problem-solving in five steps. Previous skills are combined to react in ambiguous social situations. First they learn to look for evidence, to take perspective and to determine what their own goal is in the situation. Next they use the four-cell technique to choose their action and to enact their decision with an assertive interaction style .
Session 16
Rehearsal of sessions 13, 14 and 15. And looking to the future by reviewing of all the skills of the program and listing which are most relevant for each individual.

Testing Op Volle Kracht: a selective prevention approach

In the current thesis, the effectiveness of the newly developed OVK program was tested in young adolescent of 12 to 14 years old because they stand at the beginning of the period in which the rates of depression are known to rise (Hankin et al., 1998). OVK intends to reduce depressive symptoms in those with elevated symptoms and to withhold adolescents with normative depressive symptoms from an increase in these symptoms. We conducted a prospective analysis to be able to detect a hypothesized higher rate of 'growing into depression' in the control group compared to the experimental group (Gillham et al., 2006), and to test the sustainability of the effect of OVK over time. As depression is particularly problematic in vulnerable populations such as low-income groups (Barreto & McManus, 1997; Looze et al., 2013; Smit et al., 2013), we aimed to target a selective sample of adolescents from low-income areas in the Netherlands. As such, we only invited schools to participate in our study if they received an allowance from the Dutch Ministry of Education, Culture and Science because at least 30% of their pupils live in low-income areas.

Moderators

Depression prevention programs are found to be more effective for specific subgroups with increased vulnerability to develop depressive symptoms (Merry et al., 2011; Stice et al., 2009). Also within a low-income population, specific subgroups may have an increased vulnerability to develop depressive symptoms, such as girls or women (Angold, Erkanli,

Silberg, Eaves, & Costello, 2002; Castelao, & Kröner-Herwig, 2013; Hankin, 2009; Looze et al., 2013; Nolen-Hoeksema & Girgus, 1994), adolescents with parents with depressive symptoms (Avenevoli & Merikangas, 2006; Castelao, & Kröner-Herwig, 2013; Lewinsohn et al., 2000), adolescents from an ethnic minority (Ramos-Olazagasti, Shrout, Yoshikawa, Canino, & Bird, 2013; Schrier et al., 2010; Siegel, Aneshensel, Taub, Cantwell, & Driscoll, 1998), and adolescents with elevated or subclinical levels of depressive symptoms (Cuijpers, van Straten, Smit, Mihalopoulos, & Beekman, 2008; Mezulis, Salk, Hyde, Priess-Groben, & Simonson, 2014). In addition to testing the main intervention effects of OVK among adolescents from low-income areas, we further explored whether these specific subgroups with increased vulnerability – girls, ethnic minority, adolescents with parental psychopathology, adolescents with elevated depressive symptoms- would benefit from the OVK-program more than others by conducting moderation analyses.

Mediators

To understand the mechanism through which this depression prevention program operates, we aimed to analyze whether a change in negative cognitive style is the mediating process that underlies the effectiveness of the intervention. When the mediating mechanism that account for a decrease in depressive symptoms by a depression prevention program is understood, we would be better able to optimize the effects of these programs in future, to generalize effects in practice and to bring order and parsimony to the large amount of different treatments that exist nowadays (Kazdin, 2007). A key intervention component in CBT-based depression prevention programs like OVK is a change in negative cognitions, which consequently may lead to a change in depressive symptoms. To be able to establish whether a negative cognitive style indeed plays a mediating role in depression prevention, randomized controlled trial designs with longitudinal assessments are needed. To reveal a mediating effect a cognitive style should change before an effect is found in depressive symptoms (i.e. 'time line requirement') (Kazdin, 2007). In adults, CBT-interventions are found to be associated with reductions in negative cognitions (Garrat, Ingram, Rand, & Sawalani, 2007), yet, criticism is expressed that a negative cognitive style as a mediating factor is not confirmed because the time line requirement is insufficiently explored (Kazdin, 2007). It also remains unclear whether a change in cognitive style is the underlying mechanism in depression interventions in adolescents (Webb, Auerbach, & DeRubeis, 2012). Although a single study showed that an optimistic cognitive style mediated the outcome of a depression prevention program (Yu & Seligman, 2002), in a meta-analytic review a negative cognitive style was found not to change before the depressive symptoms did (Stice, Rohde, Seeley, & Gau, 2010). In the current thesis we evaluate whether the effect of OVK on depressive symptoms is mediated by a change in negative cognitive style.

Part II: Longitudinal development of depressive symptoms, negative cognitions and negative life events

Many depression prevention programs, including OVK, operate under the premiss that negative cognitions need to be changed in order to prevent or alleviate depressive feelings. It is well known that depressive symptoms, a negative cognitive style -and also negative life events- are cross-sectionally related (Gladstone & Kaslow, 1995; Garber et al., 2002; Joiner & Wagner, 1995). However, less is known about the longitudinal inter-development of a negative cognitive style and depressive symptoms. In this thesis, besides testing the generic effect of the depression prevention program on juvenile depressive symptoms as well as the moderators, and mediating mechanism of a negative cognitive style, we also take a developmental perspective and set out to test the mutual development of depressive symptoms and a negative cognitive style during early adolescence, independently of the OVK intervention.

Development of depressive symptoms

A study using growth models that analyzed the initial depressive symptoms at early adolescence and the rate of change of depressive symptoms during adolescence showed that the magnitude of depressive symptoms on average is known to gradually increase during the teenage years (Garber, Keiley, & Martin, 2002). The lowest rates of depressive symptoms are found in the childhood period up to early adolescence, and from then, an increasing trend starts around age 13, with a strong increase between the age of 15 and 18 (Hankin et al., 1998). From the age of 18, the amount of depressive symptoms is relatively stable (Yaroslavsky, Pettit, Lewinsohn, Seeley, & Roberts, 2013). A longitudinal study that followed youth from 11 up to 18 years old showed three subgroups that followed different trajectories of the development of depressive symptoms, which were described as 1) normative (i.e. stable low), consisting of 51% of the sample, 2) increasing, consisting of 37% of the sample, and 3) early high, consisting of 12% of the sample (Mezulis, Salk, Hyde, Priess-Groben, & Simonson, 2013). Depressive symptoms should thus be seen from a developmental perspective and patterns of development of depressive symptoms seem to diverge between subgroups. These differences between subgroups may be explained by the concurrent development of a negative cognitive style and negative life events, as a more negative cognitive style, and more negative life events are significantly associated with higher levels of depressive symptoms (Gladstone & Kaslow, 1995; Garber et al., 2002; Joiner & Wagner, 1995).

Development of depressive symptoms and a negative cognitive style

Developmental theorists emphasize that a cognitive style develops from childhood to adolescence under influence of increased cognitive capacities and the accumulation of experiences (Gibb & Coles, 2005). Although children also use negative cognitions, their

interpretations of experiences become increasingly internal and stable, and they develop more stable self concepts (Gibb & Coles, 2005). As such, a negative cognitive *style* emerges over time until it becomes trait-like in early adolescence, and only from that time, the cognitive style could serve as a predictor for depressive symptoms (Cole et al., 2008). The developmental patterns of a negative cognitive style and depressive symptoms in adolescence have shown similarities, namely, adolescents who start with a negative cognitive style and become more negative in their cognitive style over time had a coincidently higher start and stronger increase of depressive symptoms over time. In line with this, those who began with a more positive cognitive style at early adolescence and continued this positive style showed a lower start an slower increase of depressive symptoms (Garber et al., 2002). Yet, how the development of depressive symptoms and a negative cognitive style affect each other is unclear as the relationship is found to be reciprocal, suggesting possible mutual dependence of the two variables (Garber et al., 2002)

Depressive symptoms, negative cognitive style and negative life events

Adolescence is known as a phase in which new challenges are involved and transitions in brains, hormones, body, social environment and interactions contribute to increasing stress (Arnett, 1999; Steinberg, 2005). Similar as depressive symptoms, negative life events have found to increase during adolescence (Garber et al., 2002). Although studies analyzing growth models found more negative life events to be related to higher depressive symptoms cross-sectionally, the rate of change of negative life events during adolescence was found to be unrelated to the development of depressive symptoms in one study (Garber et al., 2002), but to be related -only for girls- in another study (Ge, Lorenz, Conger, Elder, & Simons, 1994). Yet, the amount of negative life events is, next to depressive symptoms, recurrently of importance in theories and research that try to explain the development of depressive symptoms. While the cognitive theories depict a diathesis-stress model in which negative cognitive style is a precedent of depressive symptoms and that the relation is moderated by negative life events (Beck et al., 1979; Abramson et al., 1989), recent empirical studies have shown that also other prospective relationships exist. Longitudinal measurements of depressive symptoms, negative cognitive style and negative life events were simultaneously examined by cross-lagged panel designs in which auto-regressive associations (i.e. between subsequent measurements of a certain variable), cross-sectional associations (i.e. between measurements at one time point of different variables), and cross-lagged associations (i.e. between subsequent measurements of different variables) are analyzed. Findings revealed that each variable predicted the other: negative cognitive style predicted depressive symptoms and negative life events, depressive symptoms predicted negative cognitive style and negative life events, negative life events predicted depressive symptoms and negative cognitive style (Calvete , 2011; Calvete, Orue, & Hankin, 2013). One major issue with these cross-lagged analyses was that

only two measurements were used and therefore consistency of patterns over time could not be established. Moreover, only one of the studies (Calvete et al., 2013) was conducted among early adolescents from a community sample and had thus not been replicated. Concerning the negative life events, distinction is made between dependent life events (i.e. events to which the person has contributed) and independent life events (i.e. events that occur without the influence of the person him- or herself; Hammen, 2005). Similar as in Calvete her studies (Calvete , 2011; Calvete et al., 2013), we focused on dependent negative life events in this thesis, because they are most strongly related to depression (Patton, Coffey, Posterino, Carlin, & Bowes, 2003; Rudolph & Hammen, 1999; Rudolph et al., 2000). Although we are primary interested in the inter-development of a negative cognitive style and depressive symptoms, ignoring the influence of dependent negative life events will lead to an incomplete picture of the possibilities to prevent adolescents' depressive symptoms by targeting a negative cognitive style.

In sum, as we cannot conclude from prior research that a negative cognitive style causes or amplifies the first depressive symptoms in early adolescents, the aim of the second part of this thesis is to acquire more knowledge about the longitudinal development and interrelatedness of depressive symptoms and a negative cognitive style over time, both with and without considering the impact of the dependent negative life events. As such, we examined the prospective relationships between a negative cognitive style and depressive symptoms to shed light on whether a negative cognitive style predicted depressive symptoms, and whether these relationships are bidirectional or unidirectional. We used a cross-lagged panel design, as it provides the opportunity to analyze the cross-lagged associations between depressive symptoms and a negative cognitive style in both directions for all subsequent measurements. Moreover, we tested whether dependent negative life events affected findings on the relationships between depressive symptoms and a negative cognitive style.

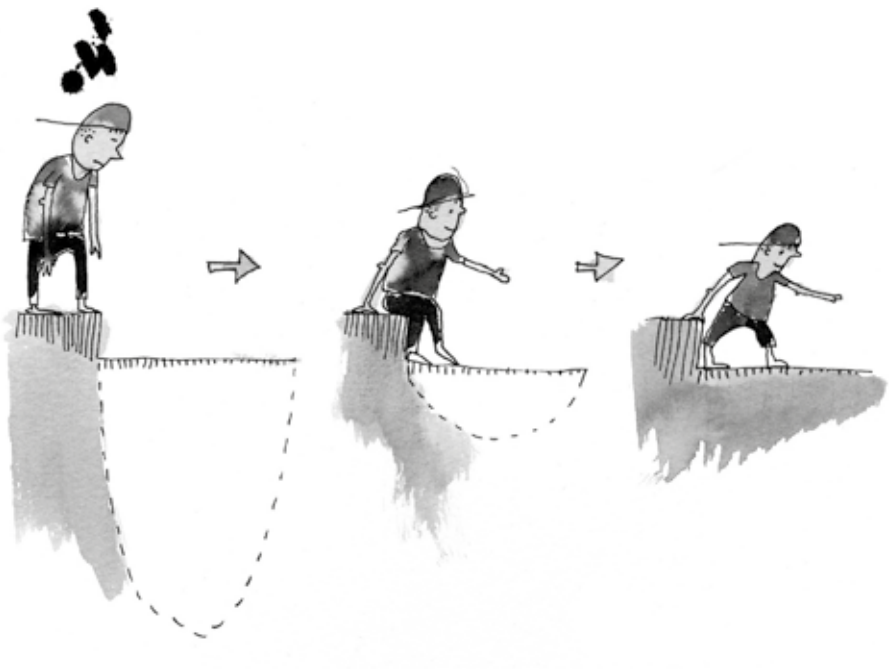
Current Thesis

The first aim of this thesis **(part I)** was to test the effects of the depression prevention OVK in young adolescents on depressive symptoms (primary outcome) and a negative cognitive style (secondary outcome). A second aim **(part II)** was to shed light on the bi-directional associations between a negative cognitive style and depressive symptoms. **Chapter 2** provides the study protocol of the effectiveness trial on OVK in a selective population of 11- to 16-years old youth from low-income areas in the Netherlands. As required by the Consolidated Standards of Reporting Trials (CONSORT) Statement (Schulz, Altman, & Moher, 2010), this study protocol introduces characteristics of the Randomized Controlled Trial such as trial design, treatment conditions and pre-specified outcome measures. **Chapter 3** presents the main outcomes of the study, analyzing the effects on

depressive symptoms at one-year follow-up. Furthermore, we tested potential moderators to verify whether certain sub-populations benefitted more from the program than others. In **chapter 4**, the main effect of OVK on the secondary outcome negative cognitive style is described. We also determined whether different trajectories in the development of a negative cognitive style existed, and whether OVK predicted the relative proportion of adolescents in those trajectories. **Part II** includes two chapters describing the longitudinal (inter-) development of depressive symptoms and negative cognitive style. **Chapter 5** is based on data derived from a universal study with 11- to 15 year olds and examines the (inter-) development of cognitive style and depressive symptoms over three measurements during a 12-month period using a cross-lagged panel design. **Chapter 6** describes the findings on a similar study design, yet, results are based on the selective sample of early adolescents from low-income areas, as is also used in chapter 2, 3 and 4, and cover four measurements during an 18-month period. Moreover, we additionally tested whether prospective associations between depressive symptoms and a negative cognitive style remained significant when controlling for the impact of dependent negative life events. A summary and general discussion of the main findings of this thesis can be found in the final chapter (**Chapter 7**), in which the limitations and implications for further research and clinical practice are also addressed.

2

EVALUATION OF A DUTCH SCHOOL-BASED DEPRESSION PREVENTION PROGRAM FOR YOUTH IN HIGH-RISK NEIGHBORHOODS: STUDY PROTOCOL OF A TWO-ARMED RANDOMIZED CONTROLLED TRIAL



Published as: Kindt, K. C. M., van Zundert, R., & Engels, R. C. M. E. (2012). Evaluation of a Dutch school-based depression prevention program for youths in highrisk neighborhoods: study protocol of a two-armed randomized controlled trial. *BMC Public Health*, *12*, 212.

Abstract

Research has indicated that depression prevention programs attenuate the development of symptoms of depression in adolescents. In the present study, the effectiveness of the Dutch depression prevention program Op Volle Kracht (OVK) provided by school teachers during school hours with adolescents from high-risk neighborhoods will be tested. We hypothesize that the OVK program will prevent or decrease reported depressive symptoms, and that this association will be mediated by cognitive distortions and alexithymia. Schools with at least 30% of their pupils living in low-income areas in the Netherlands are invited to participate in the study. Classes from vocational training up to pre-university level are eligible and 1324 adolescents (11–14 years) will be participating in the study. Randomization will be done at class level, randomly assigning participants to an intervention group (OVK) and a control group (care as usual). Trained school teachers will be delivering the program, which covers cognitive-behavioral and social problem-solving skills. Longitudinal data will be collected with self-report measurements administered in the school setting at baseline, post intervention and at two follow ups (at 6 and 12 months). Primary outcome is the level of depressive symptoms, and secondary outcomes include: cognitive errors, response style, attributional style, alexithymia, stressful life events, substance use, happiness, and school grades. If the OVK program proves to be effective when it is provided by school teachers, a structural implementation of the program in the school curriculum will enhance the quality of the lives of adolescents and their families and will reduce costs in health care. In addition, the results of the study advances current knowledge on the underlying mechanisms of the development of depression and may aid the improvement of depression prevention programs in general. Trial registration: Dutch Trial Register NTR3110

Introduction

Research pointing to the importance of cognitive distortions in the etiology and maintenance of depressive feelings has led to the development of cognitive behavioral interventions for youth. These interventions are not only used for the treatment of existing disorders, but also for the prevention of new cases. Recent meta-analyses suggest that preventive interventions can significantly reduce depressive symptoms or risk for future depressive symptoms compared to control groups (Brunwasser, Gillham, & Kim, 2009; Cuijpers, Van Straten, Smit, Mihalopoulos, & Beekman, 2008; Stice, Shaw, Bohon, Marti, & Rhode, 2009). More research is needed to test whether depression prevention programs are effective when implemented in community settings under real-world conditions, and to uncover the causal mechanisms and potential mediators of the effects (Brunwasser et al., 2009).

One of the best studied depression prevention programs is the Penn Resiliency Program (PRP; Gillham et al., 2007). PRP is a theory-based universal school-based depression prevention program designed for early adolescents (ages 10–14 years) that teaches cognitive-behavioral and social problem-solving skills. Although PRP is described as not having replicated effects across trials in the meta-analytic review across several depression prevention programs (Stice et al., 2009), positive conclusions about PRP are drawn in an evaluation of all of the 17 existing controlled studies evaluating this program with 2,498 participants in total (Brunwasser et al, 2009). Researchers testing the Penn Resiliency Program often used rigorous experimental designs with extended follow-ups (up to 36 months) showing small but significant and consistent systematic effects on depressive symptoms, especially at 12-month follow-up assessments. As such, PRP seems to be a thoroughly studied theory-based program and a good basis for further development of depression prevention. In the Netherlands, no school-based depression prevention program for adolescents exists as of yet and therefore the PRP-program has been translated and rigorously adapted to the Dutch situation in close collaboration with the original developers. The Dutch program is titled "Op Volle Kracht" (OVK; Tak et al., 2012). The primary aim of the present study is to test the transportability and effectiveness of OVK when it is delivered by school teachers and provided to adolescents with a high-risk to develop depressive symptoms (selective prevention).

Selective prevention implies focusing on a population whose risk is deemed to be above average to develop symptoms of a given disorder. This type of prevention has been found to be more effective than universal prevention (Horowitz & Garber, 2006; Muñoz, Cuijpers, Smit, Barrera, & Leykin, 2010). Commonly distinguished groups with high-risk for developing depressive symptoms are youth with: elevated depressive symptoms at baseline, a pessimistic explanatory style, parents with mood disorders, family conflicts, or youth who belong to an ethnic minority, live in low-income areas and who are more exposed to life stressors (Barreto & McManus, 1997; Bruce, Takeuchi, & Leaf, 1991; Cardemil,

Reivich, Beevers, Seligman, & James, 2007; Gillham, Hamilton, Freres, Patton, & Gallop, 2006; Horowitz & Garber, 2006; Stice et al., 2009). Youth from families with a low social economic status are exposed to chronic levels of uncontrollable negative life events and to more maternal distress because of greater economic hardship (Barreto & McManus, 1997). Selective prevention is relevant for people in the teenage years (Muñoz et al., 2010), because depression rates begin to rise in early adolescence with a peak in mid-late adolescences (Hankin et al., 1998). In the present study, a selective prevention program for depression is targeted at adolescents living in low-income areas in the Netherlands.

Since the purpose of the OVK program is to *prevent* youth from developing depression symptoms, a structural, easily accessible implementation on a large scale is needed to reach early adolescents who have not developed clinical depressive symptoms yet. This will be achieved by implementing the program in the regular school curriculum. No stigmatization will occur as a result of singling out individuals to receive the program. In addition, we expect the effects of the class-based program to be more easily consolidated because the classmates will interact and learn from each other in day-to-day experiences. For a feasible implementation of the program in the school curriculum, the following pragmatic and logistic arguments and costs have to be taken into account. Because hiring external professionals for providing the program is too expensive for most schools, it is important that school teachers are able to deliver the program. It is therefore pivotal to study whether school teachers can provide the program as effectively as clinicians and/or the developers of the program, and to evaluate practical implementation challenges and difficulties. Meta-analyses of the PRP program show significant effect sizes regardless of group leader type (Brunwasser et al., 2009), although it appears that effect sizes are higher when the program is delivered by professional interventionists compared to endogenous providers (e.g. teachers) (Gillham et al., 2006; Gillham et al., 2007; Stice et al., 2009).

Mechanisms

In addition to studying the main effects of this program on symptoms of depression, the mechanisms and possible factors underlying the effects of the program are of great interest. To this end, the mediating effects of two specific concepts will be examined in the current study: distorted cognitions and alexithymia. Distorted cognitions are important determinants of depressive feelings. Three central theories explain the etiology and maintenance of depressive feelings with the role of cognitions: Beck's cognitive theory of depression (Beck, Rush, Shaw, & Emery, 1979), the hopelessness theory of depression (Abramson & Metalsky, 1989) and the response styles theory (Nolen-Hoeksema, 1991). According to Beck's theory, stressful events activate maladaptive self-schemata (i.e. a style of cognitive interpretation), which generate specific cognitive errors such as 'overgeneralization' and 'catastrophizing'. In turn, these cognitive errors increase the chance to develop

depressive symptoms. The hopelessness theory (Abramson & Metalsky, 1989) states that an attributional style with negative outcome expectancy and expectations of helplessness about changing the likelihood of occurrence of these outcomes are causal for developing a (subtype of) depression. People with a negative attributional style have a tendency to attribute negative events to stable, global and internal factors which leads to hopelessness and consequently to symptoms of depression. Both theories describe a diathesis stress component (Metalsky, Abramson, Seligman, Semmel, & Peterson, 1982); the cognitive styles are only activated if they are accompanied by negative life events. The response styles theory (Nolen-Hoeksema, 1991) argues that the severity and duration of the symptoms of depression are determined by three styles in which individuals respond to their symptoms of depression: rumination (excessive thinking about the same topic), distraction and problem-solving. In research, the response style 'rumination' has been found to have moderating effects on the relation between life events and depressive symptoms; adolescents with a rumination response style are more likely to experience depressive symptoms when reporting more life events (Abela & Hankin, 2011). To study elevations in depressive symptoms as a consequence of cognitive distortions, longitudinal studies are needed so temporal sequences can be analyzed (Stice, Rohde, Seeley, & Gau, 2010). Research on cognitive distortions using longitudinal designs is however very limited (Lakdawalla, Hankin, & Mermelstein, 2007). We hypothesize that the OVK program will prospectively decrease the cognitive distortions of the adolescents and in turn will influence the reported depressive symptoms.

Another theoretical concept we expect to be highly relevant in relation to depression prevention programs is alexithymia. Alexithymia refers to difficulties in experiencing and verbalizing emotions and difficulties in emotional self-regulation (Sifneos, 1996). An impaired emotion processing ability is suggested to lead to negative mood states and support for this hypothesis is found with cross-sectional data: children who score higher on alexithymia are found to ruminate and worry more about emotion-evoking situations compared to children who score lower on alexithymia (Rieffe et al., 2010). Diminished alexithymia, in turn, is associated with a reduction of depressive symptoms, and although it is still unclear whether cognitive behavioral therapy can reduce alexithymia, the first hopeful results are reported (Spek, Nyklíček, Cuijpers, & Pop, 2008). We hypothesize that the OVK program leads to less alexithymia and subsequent lower levels of depressive symptoms.

The first goal of the current study is to test if the OVK program prevents symptoms of depression when the program is delivered by teachers during school hours to a whole class of adolescents. The second goal is to study the mechanisms and possible factors underlying the effects of the program.

Methods/Design

Design

The present longitudinal study involves a randomized controlled trial (RCT) with two conditions (intervention versus control; see Figure 1) in which the effectiveness and the underlying mechanisms of the Dutch school-based depression prevention program Op Volle Kracht will be examined among adolescents from low-income areas. The adolescents in the classes that will be assigned to the intervention condition will receive the 16-week OVK program from their teacher. Adolescents in the control condition will receive the usual school curriculum. While alternative interventions to control for nonspecific intervention ingredients are included in some of the PRP studies (Gillham et al., 2007), the approach of 'care as usual' is chosen in the present study because no other school-based depression prevention program is currently implemented in the Netherlands. Still, some schools do provide social skill programs and we did not forbid schools to conduct those programs. The extent to which participants are involved in other prevention programs during the course of the study will be registered.

Assessments in both the intervention and control condition will be conducted through a 50-minute web-based self-report questionnaire during school hours that will be administered at baseline, post-intervention and at two follow-ups (at 6 and 12 months). Participants do not receive incentives for filling out questionnaires. A low attrition rate is expected, because the measurements are administered during the regular school hours. The teachers will be motivated to keep complying to the protocol through personal email contact with the research team in which they receive results about the assessments on school level.

Participants and procedure

All the secondary schools in the Netherlands that meet the criterion of having at least 30% of their pupils inhabiting low-income areas will be approached for participation in the study. In the Netherlands, this information can be obtained from the Dutch Ministry of Education, Culture and Science and it is based on the average income in the postal code area in which the pupils live. The eligible schools are predominantly situated in urban areas. Two other selection criteria are the educational level and age: pupils from vocational training up to pre-university level and from the first and second grade (range 11 to 14 years old) are selected. Two weeks after approaching the school by means of a written invitation, they will be contacted by telephone. When they are interested in participating in the study, a personal visitation will follow and classes will be selected. From the participating classes, none of the pupils will be excluded, to avoid stigmatization and social exclusion. With support from the schools, all parents will receive a letter to inform them about the content and aim of the program as well as the procedures of the study. Permission from the parents for their child's participation will be obtained through informed passive

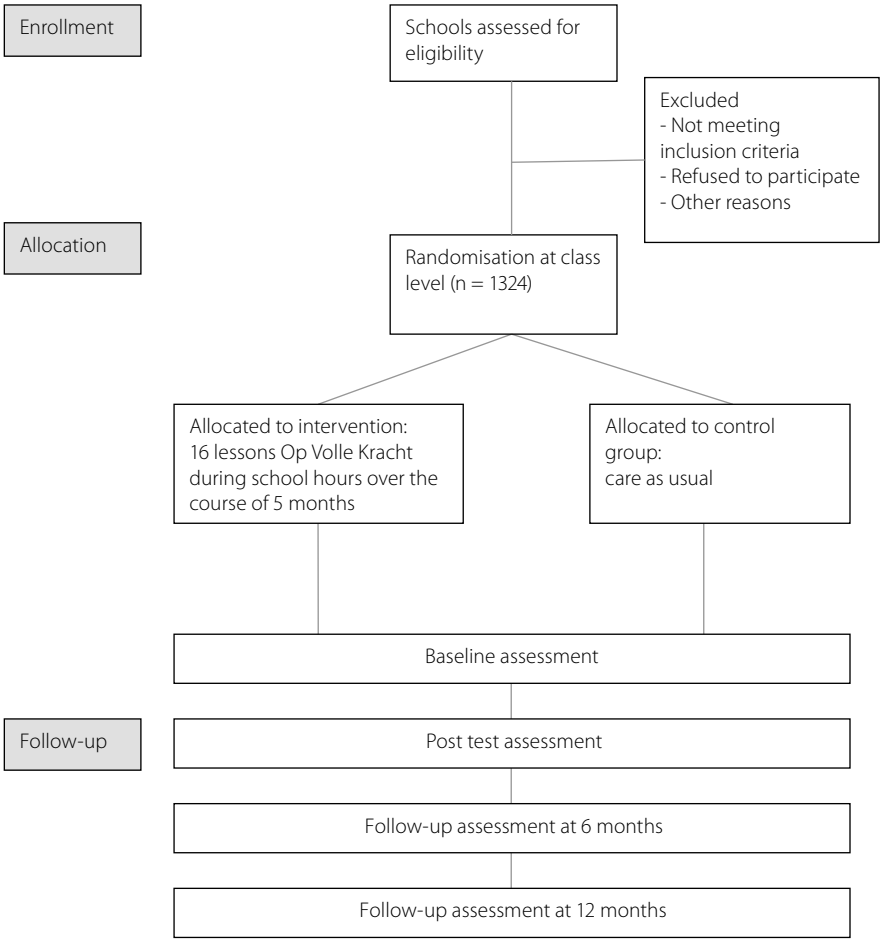


Figure 1 Study Design.

consent. If parents do not give permission for participation in the study, the adolescents will still attend the OVK program because it is taught in the regular school curriculum, but no data will be collected from them. To protect confidentiality of the data provided by the participating adolescents a unique code will be assigned to each participant. The Ethical Committee of the Faculty of Social Sciences at the Radboud University Nijmegen approved the study's protocol.

Randomization

The classes will be randomly assigned to two conditions (intervention or control). An independent researcher will perform the allocation before the baseline assessment will be administered. Randomization will be carried out centrally on class-level and within schools to control for school characteristics, using a computerized random number generator with blocked randomization scheme (block size 2) and stratified by level of education (high versus low).

Sample size

Power analysis (G-power) was conducted based on a 12-month effect size of .20. Although the expected effect size for a depression prevention program for high-risk youth is .40 (based on research of Gillham et al., 2006); see also (Stice et al., 2009), the formulated effect size is more conservative, because the intervention will be conducted in classes of approximately 25 adolescents per class instead of 10 tot 15 adolescents per group – as is done in some other school-based prevention programs (Brunwasser et al., 2009). For the power analysis, we considered potential loss of power due to clustering of data in groups at schools and due to multiple imputation and testing of mediational mechanisms. A maximum of 20% attrition over time has been taken into account as well. The sample sizes need to be 662 students per condition (alpha $< .05$, power $= .80$) and therefore the total sample size at baseline was determined to include 1,324 participants.

Intervention

The OVK program will be taught by intensively trained school teachers and covers cognitive-behavioral and social problem-solving skills. Within 16 lessons of 50 minutes that are delivered during school hours, adolescents learn to detect inaccurate thoughts, to evaluate the accuracy of those thoughts, and to challenge them by considering alternative interpretations. They also learn techniques for assertiveness, negotiation, decision-making, social problem-solving and relaxation. The skills in the program can be applied to many contexts of life, including relationships with peers and family members as well as achievement in academics or other activities. Details about the content of the program are described extensively elsewhere (Tak et al., 2012). To be able to deliver the program, the school teachers of the classes in the intervention condition will receive a 4-day training by two staff members of the research group; both of them are experienced and licensed psychologists and both are experts in cognitive behavioral therapy. The teachers receive a detailed manual of the program as guideline and they have the option to contact the trainers for additional support during program delivery.

Assessments

The primary outcome is the level of symptoms of depression and will be measured with the Children's Depression Inventory (CDI; Kovacs, 1984), which has been used in the vast

majority of RCT's on universal depression prevention programs for youth and has good internal consistency and convergent validity (Timbremont, Braet, & Roelofs, 2008). The possibly mediating factors are cognitive errors, response style, attributional style, and alexithymia. The Children's Negative Cognitive Errors Questionnaire - Revised (CNCEQ-R; Maric, Heyne, Van Widenfelt, Westenberg, 2011) will be used to measure five empirically derived negative cognitive error categories and is a revised version of the CNCEQ (Leitenberg, Yost, Carroll-Wilson, 1986), which has a good internal consistency and test-retest reliability. The response style is measured with the Children's Response Styles Questionnaire (Abela, Brozina, & Haigh, 2002) and consists of three subscales with moderate levels of internal consistency: ruminative response, distracting response and problem-solving. A shortened version of the Adolescent Cognitive Style Questionnaire (ACSQ; Hankin & Abramson, 2002) is used to measure attributional style. Adolescents rate the degree to which the cause of a hypothetical negative event is internal, stable and global. The scale has an excellent internal consistency and good test-retest reliability. Alexithymia is assessed with the subscales 'having difficulty identifying feelings' and 'having difficulty describing feelings' of the Toronto Alexithymia Scale (TAS20; Bagby, Parker, & Taylor, 1994a; Bagby, Parker, & Taylor, 1994b) with good internal consistency and test-retest reliability.

Secondary outcomes are stressful life events, substance use, happiness, and school grades. The Adolescent Life Events Questionnaire – Revised (ALEQ-R; Auerbach, Bigda-Peyton, Eberhart, Webb, & Ho, 2011) is used to assess the occurrence of a broad range of negative events which are typically reported by adolescents. The internal consistency of the scale is satisfactory. The Cantril Ladder will be used to measure happiness (Kalmijn, Arends, & Veenhoven, 2011). Academic performance will be assessed objectively by school grades we will receive from the schools. Socio-demographic variables of the adolescents and their family will be obtained by questions about gender, age, educational level, ethnicity, religious affiliation and psychiatric problems of the parents. The frequency and intensity of alcohol and tobacco use will be measured through commonly used questions that assess use of these substances (Engels & Knibbe, 2000; Engels, Knibbe, & Drop, 1999; De Vries, Engels, Kremers, Wetzels, & Mudde, 2003; Kremers, Mudde, & De Vries, 2001).

Statistical analysis

Data will be analyzed in accordance with the intent-to-treat principle but will also be analyzed separately for the completers only. Multiple imputations will be used for missing observations at follow-ups. The hypotheses will be tested with regression analyses for dichotomous and linear outcome measures in MPLUS 5.1 (Muthén and Muthén, 2007). We will check for possible baseline differences between the two conditions in demographic variables (e.g. age, gender, school level, and ethnic background) and depressive symptoms.

Moreover, variables that show different distributions between the two groups will be entered as confounders in all models testing the effectiveness of the intervention. The cluster effect – students are 'nested' in classes – will be handled by getting robust variance-related estimates using procedures for design-based analyses, (cf. Koning et al., 2009). We will correct for the cluster effects at class-level, as the interventions will be carried out in classes. Reporting of the results of the study will be in accordance with the CONSORT statement (Moher, Schulz, & Altman, 2001). Mediation models will be tested with procedures as suggested by MacKinnon and colleagues (MacKinnon, Fairchild, & Fritz, 2007).

Discussion

The aim of the study is to test the effectiveness and mechanisms of change of a Dutch school-based universal depression prevention program 'Op Volle Kracht' for adolescents with high-risk background. As we know very little yet about the mechanisms of change underlying effective CBT-based programs, we aim to test these mediating processes (Kazdin, 2007; Lakdawalla et al., 2007).

Strengths and limitations

One of the strengths of this study concerns the rigorous research design of a randomized controlled trial with a large sample (N = 1,324) to analyze the underlying mechanisms and the sequence of change in the parameters. Another strength is the assessment of the cognitive distortions as possible mediators of symptoms of depression, which are based on three well-established cognitive theories (Abramson et al., 1989; Beck et al., 1979; Nolen-Hoeksema, 1991). Further, the added construct alexithymia has not yet been studied thoroughly in combination with depressive symptoms in youth. In addition, other highly relevant outcomes, such as academic achievement, will be measured to evaluate if other effects besides stimulating mental health might be reached by this program. Further, all assessments will be completed during school hours, which will ensure low attrition rates. An additional strength of the study is that the program will be delivered by teachers in a school setting, because the results will be of great importance in the discussion about practical implementation under real-world conditions (see also Brunwasser et al., 2009). Last, the schools that will be participating in the study have a high diversity in school characteristics, e.g. Christian, Islamic, which generates a good external validity for the results of the study.

On the other hand, several limitations of this study exist. First, probably primarily motivated schools will join in the study, which may limit generalizability of the results to all schools. Second, by using a within-school design (as opposed to a between-schools design), contamination effects between the experimental and the control group could

occur, although we expect to minimize these effects by delivering the program to entire classes instead of parts of classes. Third, the measurements are solely based on self-reports. Nevertheless, with respect to internalizing problems, it has been shown that adolescents are probably better informants compared to their parents or teachers (DiBartolo & Grills, 2006). At last, no integrity check of the delivery of the program will be conducted because of financial restrictions. However, the teachers will report on program adherence by filling out forms through which they report which (part of the) lessons they have covered.

Implications for practice

If the OVK program proves to be effective in preventing elevated levels of depressive symptoms in adolescence, the study has strong practical relevance as the quality of life of the adolescents and their families will be enhanced and the costs for society and health care on the long term might be reduced. Because teachers are intensively trained, they are more likely to generalize their skills and knowledge to other parts of the curriculum. Moreover, they are expected to be more sensitive to signals of students with subclinical or clinical symptoms of depression and professional help could be consulted earlier. A structural implementation of the program in the school curriculum could be considered. In addition, the results of the study enable us to better understand the underlying mechanisms of development of depression and to improve depression prevention programs.

3

EVALUATION OF A SCHOOL-BASED DEPRESSION PREVENTION PROGRAM AMONG ADOLESCENTS FROM LOW-INCOME AREAS: A RANDOMIZED CONTROLLED EFFECTIVENESS TRIAL

Published as: Kindt, K. C. M., Kleinjan, M., Janssens, J. M. A. M., & Scholte, R. H. J. (2014). Evaluation of a school-based depression prevention program among adolescents from low-income areas: A randomized controlled effectiveness trial. *International Journal of Environmental Research and Public Health, 11*, 5273-5293.

Abstract

A randomized controlled study was conducted among a potential high-risk group of 1,343 adolescents from low-income areas in the Netherlands to test the effectiveness of the depression prevention program Op Volle Kracht as provided by teachers in a school setting. The results showed no main effect on depressive symptoms at one-year follow-up. A moderation effect was found for parental psychopathology; adolescents who had parents with psychopathology and received the OVK program had less depressive symptoms compared to adolescents with parents with psychopathology in the control condition. No moderating effects on depressive symptoms were found for gender, ethnic background and level of baseline depressive symptoms. An iatrogenic effect of the intervention was found on the secondary outcome of clinical depressive symptoms. Based on the low level of reported depressive symptoms at baseline, it seems that our sample might not meet the characteristics of a high-risk selective group for depressive symptoms. Therefore, no firm conclusions can be drawn about the selective potential of the OVK depression prevention. In its current form, the OVK program should not be implemented on a large scale in the natural setting for non-high-risk adolescents. Further research should focus on high-risk participants, such as children of parents with psychopathology.

Introduction

Depression rates are known to rise in adolescence. Among 13- to 17-year olds, almost 17% of girls, and almost 9% of boys, reported a life-time prevalence of a major depressive episode (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). A meta-analysis of more than 61.000 children and adolescents revealed that girls reported a significant increase in depressive symptoms from the age of thirteen (Twenge & Nolen-Hoeksema, 2002). Boys reported relatively stable levels of depressive symptoms across adolescence. To attenuate the increase of depressive symptoms and reduce the incidence of depressive disorders, several depression prevention group programs have been developed in the last two decades (e.g. Penn Resiliency Program (Gillham et al., 2007), LISA-T (Pössel, Horn, Groen, & Hautzinger, 2004), Coping with Stress Course (Clarke, Hawkins, Murphy, Sheeber, Lewinsohn, & Seeley, 1995). The reviews of depression prevention programs reported lower depressive symptoms in adolescents who received a prevention program compared to a control group that did not receive the intervention. However, studies reported inconsistent findings (Brunwasser, Gillham, & Kim, 2009; Horowitz & Garber, 2006; Stice, Shaw, Bohon, Mari, & Rohde 2009); therefore, additional research is needed to determine what caused these inconsistencies. Previous studies have indicated that it would be necessary to test whether adolescents with risk factors to develop depressive symptoms benefit from depression prevention programs (Munoz, Cuijpers, Smit, Barrera, & Leykin, 2010, Stice et al., 2009) and whether these programs are effective when implemented in natural settings (i.e. incorporated into schools) (Brunwasser et al., 2009; Stice et al., 2009). The aim of the current study is to test the effectiveness of a depression prevention program on a selective group of adolescents from low-income areas when implemented in a school setting under real-life conditions.

Generally, three levels of prevention are distinguished: 1) universal prevention, targeting entire populations, 2) selective prevention, targeting subgroups who have an increased risk to develop symptoms of a given disorder, and 3) indicated prevention, targeting individuals with elevated symptoms of a given disorder who do not meet the criteria of the disorder (Muñoz et al., 2010). The latter two levels are also described as targeted prevention. In a recent meta-analytic review, evidence was found that both universal and targeted depression prevention programs are effective in preventing depressive symptoms compared to no intervention (Merry et al, 2012). However, earlier reviews found that targeted depression prevention with adolescents have larger effect sizes in preventing depressive symptoms compared to universal approaches (Horowitz & Garber 2006; Stice, Shaw et al., 2009). There are several reasons why a targeted approach, compared to a universal approach, will lead to larger effect sizes (Muñoz et al., 2010). A meta-analysis of 17 PRP-studies with almost 2.500 young adolescents showed that adolescents who received the program reported fewer depressive symptoms directly after the intervention and at 6 and 12 months follow up compared to a non-intervention

control group (Brunwasser, 2009). Moreover, universal, selective and indicated prevention studies on PRP showed a significant effect on depressive symptoms, although the targeted prevention tended to be more effective compared to a universal approach (Brunwasser, 2009). Recently, a large universal study implemented and tested an adapted version of the PRP in the school curriculum in the UK (Challen, Machin, & Gillham 2013). The study found lower levels of depressive symptoms at post intervention were found, although the effect was small and did not persist at 1-year and 2-year follow up.

The research in The Netherlands that tested a translated and adapted version of the Penn Resiliency Program (PRP; Gillham et al., 2007) which was named Op Volle Kracht (OVK, Tak, van Zundert et al., 2012), showed strong effects in an indicated sample (Wijnhoven, Creemers et al., 2013), but in contrast to the PRP studies in the U.S., no effects were found in a universal sample (Tak, Lichtwarck-Aschoff, Gillham, Van Zundert, & Engels, 2015, in press). Because previous studies have found indicated but no universal prevention effects for OVK, the current study will test whether OVK has a selective prevention effect on targeted adolescents that live in lower income areas in The Netherlands. These adolescents may be more vulnerable to depressive symptoms because they are exposed to poverty and negative life events (Barreto & McManus, 1997; Bruce, Takeuchi, & Leaf, 1991; Cardemil, Reivich, Beevers, Seligman, & James, 2007). Such a selective approach has advantages for practice compared to indicated and universal prevention. First, individuals are not separated from their group during a prevention program and thus no stigmatization occurs (Barrett, 2006). Second, the costs of screening are avoided, since the program could be delivered to already existing groups, which are known to have a higher risk to develop depressive symptoms. Lastly, a larger group of vulnerable adolescents will be reached, including the adolescents who may not be at immediate risk but who may be at risk at a longer term.

When depression prevention programs are effective in a research setting, is it important to test whether these programs are as effective when they are implemented in a natural setting. Previous research has found PRP to be effective under research conditions that are difficult to implement on a larger national scale. That is, the adolescents received the program in small groups with a maximum of 14 participants and received the training after school time what caused a low attendance rate, and moreover, the teachers were intensively supervised and checked on integrity (Jaycox, Reivich, Gillham & Seligman, 1994; Gillham, Hamilton, & Freres et al., 2006; Gillham, Reivich, Seligman et al., 2007). However, with this approach PRP had significant effects when provided by teachers (Brunwasser, 2009). Thus, it is important to test the effectiveness of the program when it is fully incorporated into schools, because that will provide additional knowledge whether the program also has beneficial effect on depression prevention when it is implemented on a large scale. Moreover, concerning the feasibility of a large scale implementation, it is necessary that the mental health care costs are manageable. A school-based approach, including implementation by teachers in a classroom setting, may serve this purpose.

In the current randomized controlled selective prevention study, we examined whether the depression prevention program OVK is effective for 11 to 16 year old adolescents from low-income areas in the Netherlands when implemented at class level as part of the school curriculum and facilitated by trained teachers. We hypothesized that the OVK group would experience milder increase in depressive symptoms compared to the control group at one-year follow-up.

Additionally, previous research has demonstrated the importance of establishing subgroups that are more likely to derive benefit from a depression prevention program (Stice, 2009; Munoz, 2010). Based on theory and previous research, we will explore whether gender, clinical depressive symptoms at baseline, ethnic background and parental psychopathology moderate the intervention effects.

Gender. Boys and girls may respond differently to depression prevention programs (Merry et al., 2004), as some studies showed that girls benefitted more from these programs compared to boys (Gillham, Hamilton et al., 2006; Stice, 2009; Possel, 2008). Other studies showed that boys improved more (Clarke, Hawkins, Murphy, & Sheeber, 1993), while still others did not find such differences (Horowitz, Garber, Ciesla, Young, & Mufson, 2007).

Baseline depressive symptoms. Previous studies have found larger effects for groups with elevated baseline depressive symptoms compared to low symptom groups (Gillham, Hamilton et al., 2006; Jaycox, Reivich, Gillham & Seligman, 1994; Horowitz et al., 2007). However, it is important to know whether participants with elevated depressive symptoms can also benefit from a class based group program in which all adolescents in a classroom receive the program irrespective of their level of depressive symptoms. We hypothesized that adolescents with elevated depressive symptoms will profit more from the program than their peers with lower depressive symptoms.

Ethnic background. Depression prevention programs are developed and tested primarily in the United States and Europe (Merry et al, 2012, Stice et al., 2009). Consequently, these programs may be less effective for ethnic minority groups because of cultural differences in dealing with depressive symptoms, or the programs may not adequately address the life circumstances that minority youth face (Stice et al., 2009). On the contrary, a larger effect may be expected for minority groups, because this group reports more internalizing problems and depressive symptoms (Siegel, Aneshensel, Taub, Cantwell, & Driscoll, 1998; Ramos-Olazagasti, Shrout, Yoshikawa, Canino & Hèctor, 2013). The PRP program has been found to be effective for Latino but not African American youth (Cardemil, Reivich, Beevers, Seligman, & James, 2007), yet, more research is necessary to determine whether ethnic background moderates the effects of depression prevention programs. In the current study, we examined the moderating effects of ethnic background, by comparing the effect of the OVK program on native adolescents and ethnic minority youth.

Parental psychopathology. Adolescents of parents with psychopathology have an increased risk for developing a depressive disorder (Avenevoli & Merikangas, 2006) with an

earlier onset and a more malignant course (Lieb, Isensee, Hofler, Pfister, & Wittchen, 2002). We hypothesized that the adolescents with parents with psychopathology would profit more from the OVK intervention.

Motivation and perceived atmosphere. In addition, theoretical models like the Theory of Planned Behavior (Ajzen, 1988) and the Transtheoretical model (Porchaska et al., 1992) imply that individual's readiness to try and change is an immediate precursor of behavior change. Among the intervention group, the effect of the program might thus be influenced by the motivation of the participants to attend the program and to try to internalize the offered skills. Moreover, a negative atmosphere in groups might influence the effects of an intervention. A negative atmosphere could arise due to tediousness or adolescents' behavioral problems (Gillham, Hamilton, & Freres et al., 2006). Although externalizing problems have not been found to moderate the effect of a depression prevention program (Pössel, Seemann, & Hautzinger, 2008), it is unclear whether the perceived atmosphere can differentiate within the experimental group for whom the program works. For these reasons, we assessed the motivation before the start and during OVK, as well as the perceived atmosphere during the OVK lessons in those adolescents who were assigned to the intervention condition.

Method

Design and randomization

A non-blinded two-armed parallel group clustered randomized controlled trial was used to test the effectiveness of the OVK program among adolescents from low-income areas. Randomization was conducted within schools at the class level to control for school characteristics, with allocation ratio 1:1. The sample was stratified by level of education (high *versus* low). An independent researcher from the research institute used a computerized random number generator with a blocked randomization scheme (block size 2) to perform the allocation. This resulted in a list of classes that were allocated to control or intervention condition, which was communicated to the school by the first author.

Participants and procedure

Eligible participants for the study were adolescents in the 7th and 8th grades (age 11 – 16 years, M = 13.42, SD = 0.77) attending secondary schools in the Netherlands that met the criterion that at least 30% of their pupils lived in low-income areas. A list of these schools was obtained from the Dutch Ministry of Education, Culture and Science based on the average household income in the postal code area where the adolescent lived. Schools received a written invitation to join the study. They principals were asked to allow the teachers of the experimental group to complete the training in the OVK program and implement the OVK lessons within the curriculum. After two weeks, the schools were

contacted by telephone. If they were agreed to participate, a member of the research team visited them and selected classes. The parents received a letter about the content and the aim of the program, describing the study procedures. Parents were asked to provide permission for their child's participation through passive consent. The data were not collected from adolescents whose parents did not give permission. Yet, their attendance to the program was obligatory, since it was included in the regular school curriculum. The teachers of the classes that were assigned to the OVK condition were invited to a four-day training conducted by the research team. The participants completed online self-report questionnaires during school hours at baseline (T1, December 2011), post intervention (T2, June 2012), and at six and twelve months follow-up (T3, December 2012 and T4, June 2013). It took approximately 50 minutes to complete the questionnaire. Teachers supervised the measurements following strict guidelines when assigning personal codes to adolescents and assuring their privacy during administration. Only at T4, two schools asked support and members of the research team assisted with paper questionnaires. Incentives were given at T3 and T4 to enhance response rates. At T3, the teachers of the school were offered a cream cake when they reached a response of 90% or more. At T4, the schools received 10 euro's per completed questionnaire, which could be spent either for the school or could be given to the individual pupils.

We registered this trial registered in the Netherlands Trial Register (no. NTR3110), and the local Ethical Committee (ECG13042011) approved the study protocol, which was published (Kindt, Van Zundert & Engels, 2012).

Intervention

Participants assigned to the experimental condition received the 16 weekly lessons of OVK during school hours by their mentor, who is the designated teacher to whom parents and adolescents first can turn to in case of problems. In OVK, the adolescents are taught skills derived from cognitive behavior therapy (CBT), and social problem-solving and coping kills, through completing pen and paper exercises in a workbook, engaging in the group discussions, performing role-plays, and completing homework assignments. First, they learn about associations among situations, cognitions, feelings, and behavior. Then they learn to check the accuracy of their cognitions and to be flexible in finding alternative interpretations. Further, they learn social and coping skills, including negotiating, assertiveness and relaxation. The content of the OVK program is described in detail elsewhere (Tak et al., 2012). The teachers were extensively trained in four days by certified members of the research team. The first two days consisted of "adult skills", in which the teacher were taught to use the CBT skills on their own thoughts and feelings. During the third and fourth day, the teachers practiced all the lessons of the program, on which the trainers provided feedback. Moreover, the teachers were given a comprehensive manual that thoroughly described each exercise. In addition, we gave precise instructions as to what components might be cut in case of lack of time, as recommended by Ringwalt (2003).

During the program, the teachers could contact the research team at any time in case they had questions about the content. Teachers were asked to report how many lessons they had taught. Of the total of 28 teachers who provided the OVK lessons, 16 filled out adherence reports. On average 80.5% of 16 lessons were taught per class, with 95.3% of the first eight lessons and 65.5% of the last eight lessons being taught. After the OVK program ended, we interviewed all teachers for a qualitative process evaluation.

Measurements

Depressive symptoms. The primary outcome, *i.e.*, depressive symptoms, was assessed by the Children's Depression Inventory (CDI; Kovacs, 1984). The CDI is a self-report questionnaire comprising 27 items assessing affective, cognitive, and behavioral symptoms of depression. The item on suicide was removed in the current study to optimize collaboration with school officials and parents (cf. Tak et al., in press). For each item, participants selected one of the three statements that applied to them during the last two weeks measured on a three point scale, valued from zero to two (e.g., "I feel like crying once in a while" (0), "I feel like crying on most days" (1), "I feel like crying every day"(2)). The CDI has shown good internal consistency and validity (Evers, Braak, Frima, & van Vliet-Mulder, 2009-2011; Timbremont, Braet, & Dreessen, 2004). Cronbach's alpha for the CDI in the current study ranged from 0.85 to 0.90, indicating good internal consistency. The sum of depressive symptoms was calculated by multiplying the mean score with 27 to facilitate the comparability to other studies (cf. McCabe et al, 2011; Ondersma et al., 1997). When comparing our study with those studies that did include all items, it is important to keep in mind that the allocation to the subgroup clinical depressive adolescents might have been slightly different.

Clinical depressive symptoms. Adolescents who had a CDI-sum score of 19 or higher were labeled as having clinical depressive symptoms, as is the recommended cut-off score used in population samples (Timbremont, Braet, & Roelofs, 2008).

Ethnic background. Adolescents were asked in which country they and their parents were born. When the adolescent or one of the parents was not born in the Netherlands, the adolescent was labeled as ethnic minority.

Parental psychopathology. At baseline, the adolescent was asked whether one of the parents had been treated by a psychiatrist. If their answer was "yes", they were analyzed as youth with a parent with psychopathology.

Motivation and perceived atmosphere. We measured motivation to attend the OVK-program at baseline assessment, and the motivation and perceived atmosphere during the program at the post intervention assessments. Adolescents were asked: "How motivated are you to start with OVK"/"How motivated were you during the OVK lessons" on a four point scale, ranging from "not motivated at all" to "very much motivated". They responded to the question about perceived atmosphere in the class during the OVK program on a 7-point Likert scale ranging from "not good" to "good".

Power calculation

We conducted a power calculation, assuming a small effect size of Cohen's d = .20 at 12 month follow-up (Brunwasser et al., 2009). We considered potential loss of power due to clustering of data in classes, a maximum of 20% attrition over time and multiple imputations. The sample size per condition was fixed at 662 students (alpha < .05, power = .80).

Attrition analyses

Attrition at T1 through T4 was analyzed with logistic regression analyses in which drop-out was the dependent variable, and baseline depressive symptoms, demographics, and outcome variables were predictors. Adolescents lost to follow-up were more likely to be boys (*OR* = 1.69, 95% CI = 1.29 – 2.22, $p < .05$), ethnic minority youth (*OR* = .614, 95% CI = .464 – .814, $p < .05$), older pupils (*OR* = .915, 95% CI = .711 – 1.177, $p < .05$) and were more likely to have higher depressive symptoms at baseline (*OR* = .375, 95% CI = .219 - .641, $p < .05$).

Strategy of analyses

Baseline differences between conditions were tested with independent t-tests and Chi square analyses to assess whether randomization resulted in a balanced distribution of demographic and outcome variables. The intervention effect on depressive symptoms at one-year follow-up (T4) was analyzed by means of multivariate regression and logistic regression analyses in Mplus 7 (Muthén & Muthén, 2007), while controlling for clustering of data in classes. The dependent variables in the analyses were the continuous primary outcome variable of depressive symptoms and the dichotomous secondary outcome variable of clinical depressive symptoms. Baseline depressive symptoms and the variables for which we found baseline differences across conditions were included as covariates. Subsequently, moderating effects of gender, clinical depressive symptoms at baseline, ethnic background and parental psychopathology were tested by computing the interaction effects of these variables with condition.

The data was analyzed by means of completers only (N = 948) and intention to treat (N = 1,324). In the intention to treat approach, missing values on the primary outcome variable depressive symptoms were imputed for all four measurements using 20 imputation sets by multiple imputations in SPSS 19. Imputations were done separately for the control group and intervention group, and variables that correlated significantly with depressive symptoms were used as auxiliary variables (Graham, 2009). In addition, we performed sensitivity analyses for the secondary outcome variable of clinical depression with assumptions of extreme high or low values for missing data to assess the influence of loss to follow-up and to test the robustness of the results (cf. Schuck, Bricker, Otten, Kleinjan, Brandon, & Engels, 2014)

Post-hoc analyses were conducted to examine the treatment and prevention effects of OVK on linear increase or decrease of depressive symptoms by means of a latent growth curve approach. A treatment effect is characterized by a stronger decrease of symptoms

in the intervention group compared to the control group after the intervention has taken place. A prevention effect is characterized by an increase of symptoms in the control group and a smaller increase or no increase of symptoms in the intervention group during the course of the program or during the months or years after the intervention (Horowitz & Garber, 2006). Applying a latent growth curve approach allows us to estimate the individual growth curve of depression for each subject, including an initial level (intercept) and a certain rate of change over time (slope). A latent growth curve model can use repeated measures of depression over time as indicators of latent variables that describe group mean trajectories while allowing for between-individual differences in trajectories (Duncan et al., 2006). In this linear growth model, the depressive symptoms slope was regressed on the intervention condition variable. We also controlled for clustering effects, as adolescents were nested in classes. We controlled for the variables for which we found baseline differences.

For the OVK-group, we conducted independent t-tests to analyze differences in depressive symptoms at T4 between high and low motivated adolescents, and between adolescents that rated the atmosphere during the program as good/neutral or bad. The effect of motivation and atmosphere on depressive symptoms at one year follow-up (T4) was analyzed by means of multivariate regression (Muthén & Muthén, 2007) in which we controlled for clustering of data in classes and baseline depressive symptoms.

Results

In total, 543 schools received a written invitation to participate in the study. In the summer of 2011, 12 schools agreed to participate, providing access to 1,440 adolescents from 61 classes in which the randomization was conducted before baseline assessment. Before the start of the intervention, four classed dropped out: one school with two classes withdrew and two teachers of the intervention condition could not participate for personal reasons. Hence, these classes were considered as dropouts and excluded from the study. Finally, 1,343 adolescents from 57 classes of 11 schools participated in the study, and they were analyzed for the primary outcome. In total, 667 adolescents were allocated to the OVK depression prevention program and 676 adolescents to the control condition receiving the regular school curriculum. The participation rates at the baseline and post intervention measurements were good (T1: 93,7% and T2: 85.8%). After T2 12.3% dropped out due to change of schools and by consequence, the participation rates decreased in the two follow up assessments (T3: 72.5% and T4: 74.5%). See Figure 1 for the participant flow diagram.

Descriptive statistics

The baseline characteristics, mean depressive symptoms and percentages of clinical depressive symptoms for all measurements are shown in Tables 1 and 2. Descriptive analyses showed significant differences between the conditions in baseline parental psychopathology (X^2 [1] = 3.87, p = .049). The control condition included a greater number of adolescents who had parents with psychopathology. Therefore we used parental psychopathology as a covariate in all analyses.

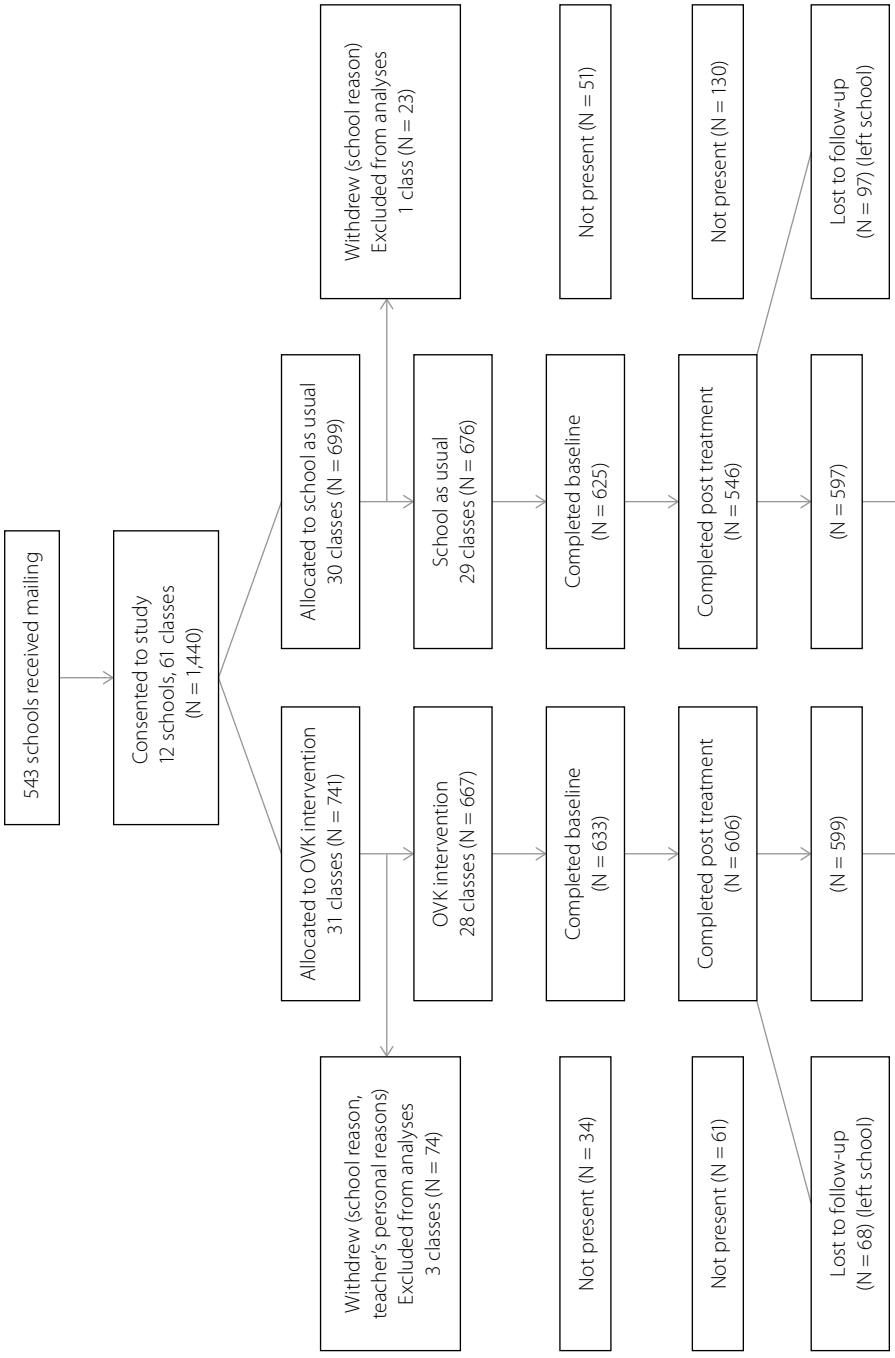
Main effects of OVK on depressive symptoms

Regression analyses did not reveal the main effects at 12 months follow-up for the OVK intervention on the primary outcome of depressive symptoms, both for Completers Only (CO) (β = -.049, SE = .041, p = .24) and Intention To Treat (ITT) (β = -.044, SE = .037, p = .23). An iatrogenic main effect of the OVK intervention was found in CO and ITT analyses on the secondary outcome of clinical depressive symptoms (CO: *OR* = 0.558, 95% CI = 0.352 – 0.886, $p < .05$; ITT: *OR* = 0.564, 95% CI = 0.338 – 0.790, $p < .01$). Compared to the control group, more adolescents in the OVK group reported depressive symptoms above the clinical cut off at 12 months follow-up.

Sensitivity analysis

Because of the power for the current study was calculated based on our primary outcome of depressive symptoms and not on the secondary outcome of clinical depressive symptoms, we wanted to check the robustness of the iatrogenic effect on clinical depressive symptoms with a sensitivity analysis. We did not conduct a sensitivity analysis for the primary outcome of depressive symptoms because (a) the power was calculated to detect significant effects on this outcome and (b) the regression analyses on the primary outcome convincingly showed no significant main effect. Sensitivity analyses for the primary outcome were not expected to lead to a different conclusion.

We conducted sensitivity analyses for the secondary outcome of clinical depressive symptoms with two scenarios. In the first scenario, we imputed non-clinical depressive scores (*i.e.*, best case scenario) for all missing data at T4. In the second scenario, we assumed clinical depressive scores (worst case scenario). Regardless the scenario we used, the absolute difference of the amount of adolescents with clinical depressive symptoms between the control condition and the OVK condition is similar. However, the relative difference will be higher in the best case scenario compared to the worst case scenario, and will thus easier result in a significant result. In the conducted sensitivity analysis, the iatrogenic effect was only found in the best-case scenario (OR = 0.576, CI = 0.366 – 0.908, $p < .05$), but not in the worst-case scenario (*OR* = 0.893, 95% CI = 0.578-1.380, p = .61). Thus, this indicates that the iatrogenic effect might be influenced by the manner in which missing data is dealt with.


543 schools received mailing
Consented to study
12 schools, 61 classes
(N = 1,440)
Allocated to school as usual
30 classes (N = 699)
Withdrew (school reason)
Excluded from analyses
1 class (N = 23)
School as usual
29 classes (N = 676)
Not present (N = 51)
Completed baseline
(N = 625)
Not present (N = 130)
Completed post treatment
(N = 546)
Lost to follow-up
(N = 97) (left school)
(N = 597)
Allocated to OVK intervention
31 classes (N = 741)
Withdrew (school reason,
teacher's personal reasons)
Excluded from analyses
3 classes (N = 74)
OVK intervention
28 classes (N = 667)
Not present (N = 34)
Completed baseline
(N = 633)
Not present (N = 61)
Completed post treatment
(N = 606)
Lost to follow-up
(N = 68) (left school)
(N = 599)

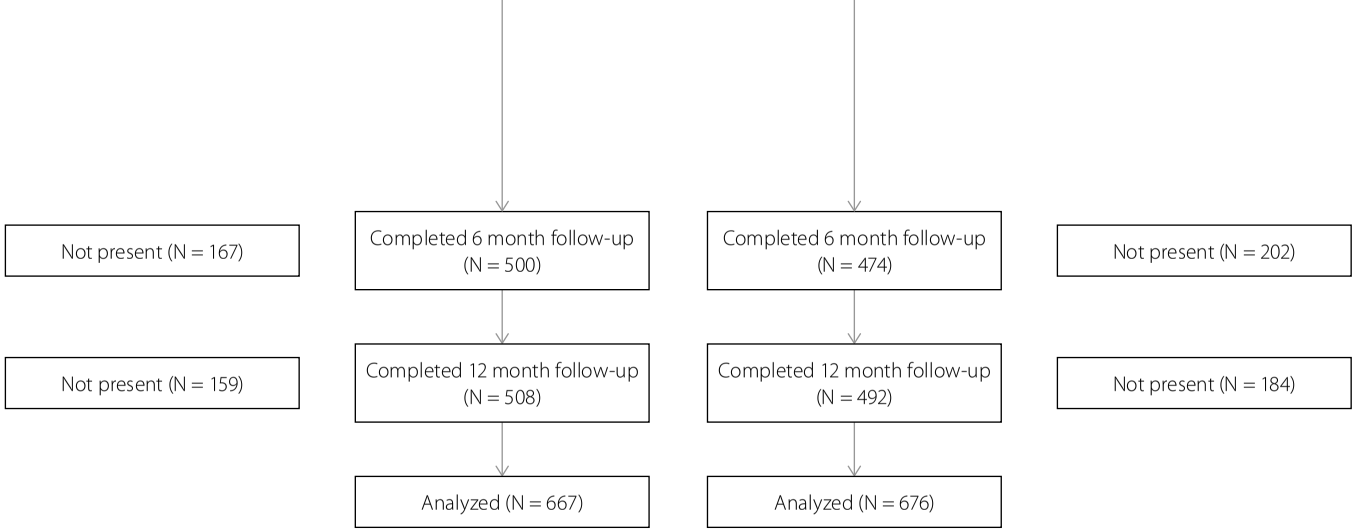


Figure 1 Flow Diagram.

Table 1 Baseline Characteristics.

Characteristic	OVK Condition N = 667	Control Condition N = 676	Total N = 1,343	Significant Difference I-C
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	
Gender (%)				ns.
Girls	51.1	53.4	52.3	
Boys	48.9	46.6	47.7	
Age	13.42 (0.79)	13.42 (0.76)	13.42 (0.77)	ns.
Ethnic background (%)				ns.
Native Dutch	46.0	49.4	47.7	
Ethnic minority	54.0	50.6	52.3	
Parental psychopathology (%)	4.6	7.2	5.9	$p < 0.05$
School level (%)				ns.
Low	46.8	44.5	45.6	
High	53.2	55.5	54.4	
Sum depressive symptoms	8.56 (6.68)	8.55 (6.33)	8.55 (6.51)	ns.
Clinical depressive symptoms (%)	7.4	6.9	7.2	ns.

Notes: Logistic regression analyses were used to calculate differences between Intervention (I) and Control (C); ns. = non-significant.

Table 2 Means (and Standard Deviations) of Sum Depressive Symptoms and Percentages of Clinical Depressive Symptoms at All Measurements (T1–T4) Separately for Conditions.

Outcomes	T1	T2	T3	T4
Sum depressive symptoms	8.55(6.51)	9.47 (7.72)	9.64 (8.19)	9.62 (8.48)
OVK	8.56 (6.68)	9.53 (7.98)	9.17 (7.99)	10.00 (9.14)
Control	8.55 (6.32)	9.39 (7.43)	10.14 (8.37)	9.22 (7.74)
Clinical depressive symptoms (%)	7.2	9.8	12.1	13.2
OVK (%)	7.4	10.5	10.4	16.3
Control (%)	6.9	9.0	13.8	10.0

Moderation

No moderation effect on the relation between condition and depressive symptoms was found at T4 for gender, clinical depressive symptoms at baseline, ethnic background, and parental psychopathology for both ITT and CO. Regarding the relation between condition and clinical depressive symptoms, only parental psychopathology was found to have moderating effects on the outcome for the completers only group (CO: *OR* = 0.121, CI 95% = 0.029 – 0.505, $p < .01$) and a marginal effect for the intention to treat group (ITT: OR = 0.239, CI 95% = -0.155 – 0.633, $p = .087$). Concerning the prevention of clinical depressive symptoms, adolescents who received the OVK-program and had parent with psychopathology showed significantly lower levels of depressive symptoms compared to adolescent who were in the control condition and had parents with psychopathology. More specific, the adolescents with parents with psychopathology had a probability of 0.11 to have clinical depressive symptoms at T4 when they received the program, to a probability of 0.29 for those who had parents with psychopathology and did not receive the program (see Figure 2).

Post-hoc analyses

Latent Growth Curves. Post-hoc analyses were conducted to examine the effect of the OVK program on linear increase or decrease in depressive symptoms by means of latent growth curve approach. First, we tested the initial developmental model (*i.e.*, no predictors) for depressive symptoms. The fit between the data and the model was excellent (X^2 (df = 5)) = 12.804, $p < .05$, RMSEA = .032, CFI = .981, TLI = .977). The intercept was significant (β0 = 1.17, $p < 0.001$), but the slope was not (β1 = 0.014, $p = 0.82$), indicating that participants

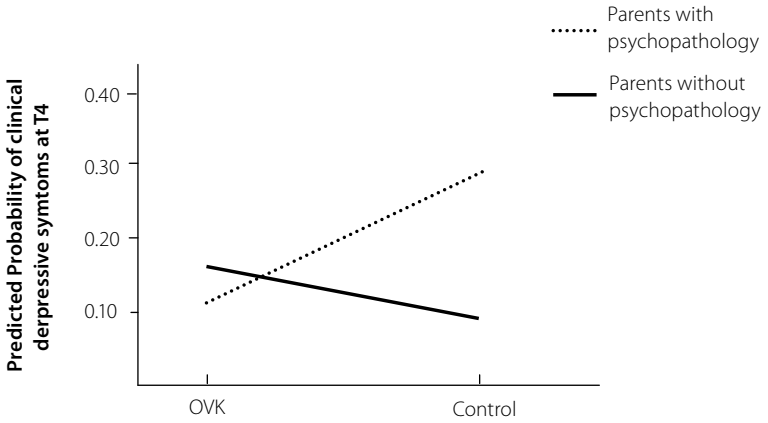


Figure 2 Interaction Effect for Adolescents with/without Parents with Psychopathology and Condition.

scored above zero on depressive symptoms on baseline but that depressive symptoms remained stable over time. The variance of the slope was significant ($p < 0.001$). We additionally tested possible quadratic trends, but these were not significant. Study condition was included as a predictor of depressive symptoms, and we controlled for parental psychopathology to test the effect of the intervention on the slope. Condition was unrelated to the intercept (β = -0.012, p = .77) and the slope of depressive symptoms (β = -0.021, $p = 0.73$). This indicates that the increase or decrease in depressive symptoms across follow-ups did not differ between the intervention and control condition. The fit between model and data was excellent (X^2 [df = 9] = 24.48, $p < .01$, RMSEA = 0.035, CFI = 0.976, TLI = 0.963).

Motivation. Adolescents who attended the OVK program reported various levels of motivation before and during the course of the OVK lessons: not motivated at all (11.4% before, 22.9% during), a little bit motivated (22.9% before, 41,9% during), pretty much motivated (29% before, 22,7% during), very much motivated (6.0% before, 6,0% during) and did not know (24% before, 6,4% during). Most participants rated the atmosphere during the OVK lessons neutral (40,0%) or positive (38,7%). An independent t-test revealed no difference between high and low motivated adolescents, as reported *before* the intervention started, in depressive symptoms at T4 ($t = 1.66$, $p = .099$). However, significant lower depressive symptoms were found at T4 for adolescents who reported to be motivated during the program compared to low-motivated adolescents ($t = 2.57$, $p < .05$). Additionally, adolescents who rated the atmosphere during the program neutral to good reported less depressive symptoms at T4 compared to those that rated the atmosphere as bad ($t = 3.15$, $p < .01$). Additional regression analyses, in which we controlled for depressive symptoms at T1, revealed that motivation *during* the program (β = - 0.112, SE = .052, $p < .05$) and the reported atmosphere (β = - 0.108, SE = .051, $p < .05$) predicted depressive symptoms at T4. The participants who rated the atmosphere in the class during the OVK program as more positive and who were more motivated, had less depressive symptoms at T4.

Discussion

The present study examined the effectiveness of the depression prevention program OVK by means of an RCT-design in a selective population of 11 to 16 year old adolescents from low-income areas in The Netherlands. There are three important findings that will be discussed in detail below. First, contrary to what we expected, we did not find an effect of the OVK program on the primary outcome of depressive symptoms one year after the intervention. Second, we found an interaction effect of condition with the presence of parental psychopathology. Third, we found an iatrogenic effect on clinical depressive symptoms at one year follow-up. In contrast to other studies, we did not find any

preventive effects on depressive symptoms, what may be explained by factors that have previously been identified as predictive of the impact of depression prevention programs, namely participants, providers, content, and study design (Stice et al, 2009).

Participants

First, our participants had baseline depressive symptoms (M = 8.55) below the 70th percentile of depressive symptoms (Timbremont, Braet, & Dreessen, 2004), which is only slightly higher than in universal depression prevention studies that were conducted in a non-high-risk, population sample (M = 8.29, Challen et al, 2013; M = 7.56, Tak et al., 2015, in press). In a truly selective sample, adolescents would be expected to have higher baseline depressive symptoms and consequently have more room for improvement, which would increase the possibility to find significant effects (Muñoz, Cuijpers et al. 2010). Indeed, studies that found effects generally included participants who scored higher on depressive symptoms at baseline (e.g. CDI > 11 in Gillham 2012; CDI > 12 in Gillham, Hamilton et al, 2006 and CDI > 20 in Wijnhoven et al, 2013). Additionally, the latent growth curves showed no changes in the development of depression over time in both the intervention and control groups, underlining the notion that our included adolescents are not at a high-risk to develop symptoms. Although adolescents from low-income areas are more vulnerable to develop depressive symptoms (Barreto & McManus, 1997; Bruce, Takeuchi, & Leaf, 1991; Cardemil, Reivich, Beevers, Seligman, & James, 2007) this might not be true for The Netherlands, because it is a high-income country with relatively high standards even in low-income areas. Moreover, in our selective group, at least 30% of the adolescents came from low-income areas, which means we cannot rule out that a significant proportion of the sample may not belong to a low-income group. It is, thus, debatable whether we actually reached a selective high-risk population. The program was not effective with the selective approach that we took. However, taking a different selective approach might lead to better effects (e.g., selecting adolescents whose parents have a psychopathological disorder). In addition, we did not find a moderating effect for initial depressive symptoms, what suggests that the outcome did not differ for adolescents with elevated depression scores. Still, the program might be effective when selecting a homogeneous group of adolescents with elevated depression scores. In this latter case, discussed topics within the OVK program will probably be more recognizable for these adolescents, which could positively influence the interaction in the group and make the program more helpful.

Another explanation why we did not find an intervention effect is that the participants might have been too young. The increase in depressive symptoms is found to be strongest between 15 and 18 years old (Hankin, Abramson et al., 1998), while in our study the mean age at baseline was 13 years. When delivering the program to older adolescents, the control group might experience an increase in depressive symptoms and a prevention effect might become apparent, which would be in line with reviews showing that

depression prevention programs are more effective for older adolescents (Brunwasser, 2009; Stice et al 2009). Because of their young age and the apparent absence of depressive symptoms, it could also be argued whether they recognize themselves in the program's used examples, what could make our sample less susceptible for the taught skills. This is in line with other studies on large scale, school-based CBT interventions with a similar age group that also did not find effects on depressive symptoms (Sawyer et al., 2010; Araya et al., 2013).

In the intervention group, we found that the program decreased the levels of depressive symptoms among adolescents reporting to be more motivated *during* the program. It might be that the motivated adolescents learned and used more skills from the program, as would be in line with earlier findings, which showed that motivation to learn is significantly related to course outcomes (Klein et al, 2006). Moreover, the reported motivation *prior* to the training did not predict for whom the OVK training was effective, and thus it does not seem useful for further research to create a selective a group using this criterion.

Finally, a negatively perceived atmosphere in class during the OVK program might have decreased the effectiveness of the program, since adolescents who perceived the atmosphere during the OVK lessons as negative were more likely to have relatively higher levels of depressive symptoms. From our study it remains unclear what may have caused a negatively perceived atmosphere. In accordance with the expressed concerns of the teachers in the process evaluation, it might be that the content of the OVK program is less well covered when the atmosphere is negative, which might have reduced the impact of the program. Although this effect could also be explained by a negative information bias that is hypothesized to be a vulnerability for developing depressive symptoms (Gotlib & Krasnoperovea, 1998).

Providers

Although the PRP program on which the OVK program is based, was found to be effective when delivered by both teachers and professional interventionists (Brunwasser, 2009), the current trial revealed no effects of our program, when provided by teachers. Possibly, the teachers who administered our program have reduced its effect, what would be in line with meta-analytic findings on several depression prevention programs, which showed that teachers are less effective in delivering prevention programs compared to professional interventionist (Stice et al., 2009), as is also found in a recent RCT which compared teachers and psychologists as providers (Wahl, Adelson, Patak, Possel, & Hautzinger, 2014). One reason may be that teachers in our study received a four-day training in CBT and the specific OVK program techniques, what might not have been sufficient to convey the curriculum's content and the key teaching techniques in all its details, which could have decreased program fidelity. In some other depression prevention studies, teachers indeed received a more intensive training (e.g. Gillham et al., 2012), and higher intervention fidelity

could possibly have generated stronger effects (Gillham et al., 2006. On the other hand, other studies showed significant effects on depressive symptoms even though the training for the teachers was less intense (Spence, Sheffield, & Donovan, 2003). However, even if the OVK program could be effective when teachers are trained more extensively, it may be unrealistic to expect teachers to invest in a longer training on top of their usual workload.

Content

In the process evaluation of the OVK trial, teachers reported that the duration of the program (16 lessons) was too long. Specifically, the teachers reported difficulties in keeping the students motivated and emphasized that students complained that the lessons are boring. Additionally, teachers indicated to have too little time left for other classroom responsibilities. The adherence to the program, as reported by the teachers, was higher during the first half of the program compared to the second half of the program. However, we cannot draw strong conclusions on the effect of adherence level on program effectiveness, since not all teachers completed adherence reports (12 of 28 did not). The skills based on CBT techniques during the first half of the program might have been taught more thoroughly compared to the second part, which focused on coping and social skills. It is possible that the coping and social skills are influential factors of the program and that their suboptimal implementation is in part responsible for the absence of the intervention effect. However, the content of CBT based programs was not found to influence the magnitude of program effects in a meta-analytic review (Stice, et al. 2009). Still, based on our process evaluation and the finding that programs with a shorter duration tend to have larger effects (Stice et al., 2009), a shorter duration of the program might be more effective.

Study design

Although a review of CBT based depression prevention programs has not shown differences in the effect between study designs (e.g., amount of follow-up measurements) (Stice et al., 2009), the possible effect of adding long-term follow-up measurements after one year should be considered. We did not find an effect at one year follow-up, although theoretically, it would be possible that a prevention effect would occur only after a longer period. Adolescents could then be confronted with situations in which they can use the learned skills and the adolescents of the control group might grow into higher elevated depressive symptoms. However, in previous meta-analytic reviews, the strongest effect is found within one year after the intervention (Horowitz and Garber, 2009; Merry et al, 2011), and therefore the findings of our study might not have been different when we had used a longer follow-up period.

Moderation

Parental psychopathology moderated the relation between condition and clinical depressive symptoms. Adolescents who had parents with psychopathology and received the OVK program had less depressive symptoms compared to adoelscents who had parents with psychopathology and were in the control condition. Although these findings are based on only 5.9% of the participants in the current study and thus a type I error could have occured, they add to previous research in which CBT interventions for adolescents with parents with psychopathology is also found to be effective (Clarke, Hoornbrook, 2001; Garber, Clarke et al, 2009). The selective group of adolescents with parents with psychopathology may be a particularly important subgroup for future prevention efforts.

Iatrogenic effect

Besides the lack of a main effect of the OVK program on depressive symptoms, we found an iatrogenic effect on clinical depressive symptoms at one year follow-up. We emphasize that this finding should be interpreted with caution because of the lack of robustness of this results when performing sensitivity analyses. Within the OVK group, we did not find differences in baseline characteristics between the adolescents who had clinical depressive symptoms at one-year follow-up and those who had not. In addition, we neither found differences for motivation during the program and perceived atmosphere. Accordingly, we can only speculate which adolescents might develop depressive symptoms more easily after following OVK. During the lessons, adolescents become more aware about their thoughts, feelings and behavior, which may enhance awareness of the presence of their inappropriate depressive thoughts and feelings. This may in turn decrease self-efficacy to deal with these thoughts and feelings and consequently increase of depressive symptoms. Previous research has found that students low in general self-efficacy benefit more from a depression prevention program than their high self-efficacious peers (Possel, Baldus, Horn, Groen, & Hautzinger, 2005), however, whether a depression prevention program influences self efficacy negatively and by consequence causes an iatrogenic effect would be of interest for further research.

Limitations

The present study should be interpreted in the light of it's limitations. A first limitation stems from the sole use of self-report questionnaires for measuring depressive symptoms, which we did not compare with reports of parents or teachers. However, for internalizing disorders such as depression, self-reports are described to be more reliable (DiBartolo & Grills, 2006). Still, interviews are preferred for longitudinal research on depression (Twenge & Nolen-Hoeksema, 2002), and research that aims to examine effects of intervention on clinical diagnoses. Another limitation concerning the questionnaires is that parental psychopathology is measured by a single item in which the adolescent reports whether or not a parent is treated by a psychiatrist. Future research on the reliability of this measure

is needed. Also a limitation of the study is that relatively more boys, minority youth, older pupils and adolescents with higher depressive symptoms at baseline were lost to follow-up. Although most participants dropped out because they changed schools, the analysis indicated no difference in dropout between conditions and the analyses conducted separately for intention o treat and completers only did not reveal any differences. Still, attrition might reduce the generalizability of our findings. Another limitation is that the study was non-blind; the teachers and adolescents knew whether they received the program or not. This could have resulted in a placebo effect of the program. However, a placebo effect is not likely to have occurred since we did not find an effect of the intervention. Moreover, adolescents were not notified about the goal of the study. Also, due to the nature of the study in which we did not apply an active control condition, it would be difficult to keep the conditions unknown to the participants. Future studies are encouraged to apply a design using an active control condition in which participants are blinded to the study conditions. In order to maximize the generalizability of the present study to the natural setting, we decided to keep the requirements for the teachers close to what would be a reasonable investment after a widespread intervention in real life. Therefore, we decided not to check teachers' program integrity and adherence elements such as quality of delivery during the course of the study. Although we expect that audiotaping several lessons and checking them on integrity (cf. Gillham et al, 2007; Gillham, 2012) would increase the teachers' efforts to deliver the program as mentioned, we expected that such checks will decrease schools and teachers' willingness to adopt a program in their curriculum. Finally, with regard to the interaction effect of parental psychopathology, it is important to notice t hat only 5.9% of the participants reported their parents to have psychopathology. Because of possible power limitations this effect should be interpreted with caution and should be replicated in future studies.

Summary and implications for further research

The OVK program administered by teachers in a school setting revealed no effects on depressive symptoms of adolescents from low-income areas in the Netherlands. Further research is recommended, since previous research on depression prevention reported encouraging results. Because it can be argued whether our population was actually a high-risk selective population, future selective prevention research should use select participants that are more at risk than adolescents from low-income areas, such as children of psychiatric parents or adolescents of an older age.

4

THE EFFECT OF A DEPRESSION PREVENTION PROGRAM ON NEGATIVE COGNITIVE STYLE TRAJECTORIES IN EARLY ADOLESCENTS

Resubmitted for publication: Kindt, K. C. M., Kleinjan, M., Janssens, J. M. A. M., & Scholte, R. H. J. The Effect of a Depression Prevention Program on Negative Cognitive Style Trajectories in Early Adolescents. *Health Education Research*.

Abstract

As restructuring a negative cognitive style is a central skill taught in CBT-based depression prevention programs, we tested whether such a program evoked a change in negative cognitive style in adolescents. Additionally, we examined whether distinct developmental trajectories in cognitive style existed, and whether research condition (intervention versus control) predicted adolescents' trajectories. Young adolescents (N = 1,343; Mean age = 13.4 years, SD = 0.77) were randomly allocated to the depression prevention program or the control group. Negative cognitive style was assessed at baseline, post treatment and two follow-ups. Results showed that adolescents receiving the depression prevention program did not differ in their negative cognitive style compared to the control group. We found four distinctive trajectories of negative cognitive style: *normative*, *increasing*, *decreasing*, and *stable high,* which were not significantly predicted by intervention condition. Yet, a trend contrary to our hypothesis revealed; adolescents who followed the program tended to have more often an *increasing* trajectory than a *normative* trajectory, while no difference was found between the adolescents in the research conditions for a *stable high* and a *decreasing* trajectory. We concluded that the CBT-based depression prevention program we tested did not reduce or to prevent an increase in negative cognitive style.

Introduction

During the past decades, depression prevention programs have been developed to protect adolescents against the development of depression. Many of those programs provide groups of adolescents skills from cognitive behavioral therapy (CBT), and of these skills, the cognitive restructuring technique is pivotal (Gillham et al., 2007; Kindt, Kleinjan, Janssens, & Scholte, 2014; Pössel, Horn, Groen, & Hautzinger, 2004; Sochet et al., 2001). Systematic reviews suggested that providing CBT-based programs is a promising approach for depression prevention in adolescents (Calear & Christensen, 2010; Merry et al., 2012). However, whether the effect of these programs results from a change in the ostensive mediators such as a cognitive style is not clearly established by research (Collins & Dozois, 2008; Stice, Rohde, Seeley, & Gau, 2010). Earlier studied depression prevention programs have divergent result with regard their effect on a negative cognitive style; whereas some were found to be effective (e.g. Gillham, Hamilton, Freres, Patton, & Gallop, 2006), others were not (e.g. Sawyer et al., 2010). Previously, we concluded from a Randomized Controlled Trial that the CBT-based depression prevention program 'Op Volle Kracht' (OVK) was not effective in preventing depressive symptoms in young adolescents (Kindt et al., 2014). Yet, although restructuring a negative cognitive style was one of the most important skills taught, we did not analyze whether the program was able to cause a change in the adolescents' negative cognitive style. It might thus be that the program was not effective in depression prevention because it failed to change a negative cognitive style, or it might be that the program was effective in changing a negative cognitive style, but that this did not subsequently lead to a change in depressive symptoms. In the current study, we therefore aimed to determine the impact of the depression prevention program OVK on a negative cognitive style.

Previous studies that tried to disentangle the mechanism of change set in motion by depression prevention programs have not yet resulted in clear conclusions regarding the potential mediating role of a negative cognitive style. One study qualitatively explored what adolescents perceived as the changing mechanisms after attending an effective CBT-based depression prevention program, and revealed that adolescents mainly reported improvement in interpersonal relationships and self-regulation, and to a lesser extent a change in their cognitive style (Shochet, Montague, Smith, & Dadds, 2014). A quantitative study, that compared a CBT-based depression intervention with a control group, showed that at post-treatment the CBT group reported significantly less depressive symptoms and a marginally significant decrease in negative cognitive style compared to the control group (Horowitz, Garber, Ciesla, Young, & Mufson, 2007). Moreover, a negative cognitive style partially mediated the relation between the intervention and the reduced depressive symptoms. Another empirical study on a CBT-based depression intervention that was used to test this mediating factor showed an intervention effect on both the main outcome of depressive symptoms and the mediator negative cognitive style. Nevertheless,

the researchers concluded that negative cognitions did not mediate the intervention effect because the depressive symptoms changed before the mediator did (Stice et al., 2010). Hence, although research is sparse and inconclusive, and findings on the mediating role of a negative cognitive style are mixed, it indicates that effective depression prevention programs may influence a negative cognitive style.

When investigating a negative cognitive style as a potential mediator in the relation between receiving a depression prevention program and a change in depressive symptoms, it is important to realize that there might be substantial individual variation in the development of a negative cognitive style over time. Longitudinal research on cognitive style in 11-, 13- and 15-year olds identified three trajectories of how a negative cognitive style developed (Mezulis, Funasaki, & Hyde, 2011). First, a large group with a *normative* trajectory was identified, which consisted of 71% of the sample and showed low scores on negative cognitive style at all assessments. A second group (22% of the sample) had an *increasing* trajectory, with normative scores at baseline and an increase in negative cognitive style over time. At last, a *decreasing* trajectory was defined, which included 7% of the sample and displayed a high negative cognitive style at age 11, and a decreasing pattern at the two follow-ups. Although the three empirically found trajectories are theoretically well applicable, we would also have expected a fourth, *stable high* trajectory in which adolescents with a relatively high negative cognitive style at baseline maintain this cognitive style over time. This would be in line with research that revealed that a cognitive style becomes trait-like in young adolescents (Cole et al., 2008) and that patterns of cognitive vulnerability are stable over the years from late adolescence to early adulthood, also for those with a highly negative cognitive style (Romens, Abramson, & Alloy, 2009). In Mezulis' study (2011) it may be that the 4th trajectory was there but there were insufficient people in it to reach significance (N = 366). Because of the expected variation in the development of a negative cognitive style, we aimed to investigate the effect of a depression prevention program on the differential development of a negative cognitive style over time.

When distinct trajectories in the development of a negative cognitive style indeed exist, a depression prevention program may influence developmental trajectories of a negative cognitive style. More specifically, the adolescents attending a depression prevention program might more often follow a *normative* trajectory, instead of an *increasing* trajectory, because the newly learned skills may prevent them from developing a more negative cognitive style. In addition, adolescents who attend a depression prevention program may also be more likely to follow a *decreasing* trajectory instead of a *stable high* trajectory, because they learn to change their negative cognitive style into a more helpful, realistic cognitive style. We hypothesized that, compared to adolescents not receiving a depression prevention program, a relatively larger proportion of the adolescents receiving a depression prevention program would show a *normative* trajectory and a relatively smaller proportion an *increasing* trajectory. We also hypothesized

that, compared to the control group, a relatively larger proportion of the adolescents from the intervention group would show a *decreasing* trajectory and a relatively smaller proportion a *stable high* trajectory.

Previously, researchers have discussed whether gender differences play a role in the development of a negative cognitive style in adolescence. In a review, no clear conclusions were drawn due to mixed results, as some studies found no differences while others found a higher negative cognitive style for adolescent girls than boys (Nolen-Hoeksema & Girgus, 1994). More recent studies found that, although there is no difference in negative cognitive style between girls and boys in childhood, girls have a more negative cognitive style compared to boys in adolescence (Hyde, Mezulis, & Abramson, 2008; Hankin & Abramson, 2002; Mezulis, Funasaki, Charbonneau, & Hyde, 2010). Given that girls tend to develop a more negative cognitive style in adolescence than boys, and that they profit more from depression prevention programs than boys (Stice et al., 2009; Pössel, Seemann, & Hautzinger, 2008) developmental trajectories of cognitive style may be different for girls than boys, and a depression prevention program targeting a negative cognitive style might sort more impact in girls than boys.

The purpose of the current study was to examine the effects of the depression prevention program OVK on a negative cognitive style in young adolescents. To understand the impact of the program on developmental changes in a negative cognitive style, we also aimed to examine whether distinctive trajectories of a negative cognitive style existed. We hypothesized to find trajectories in accordance with earlier studies, including a *normative*, an *increasing* and a *decreasing* negative cognitive style (Mezulis et al., 2011), and additionally a theoretically based fourth trajectory named *stable high*. Concerning the predictability of membership to a certain trajectory, we hypothesized that, compared to adolescents from the control condition, the adolescents from the OVK condition would relatively more often have a *normative* trajectory than an *increasing* trajectory, and relatively more often a *decreasing* trajectory than a *stable high* trajectory. Moreover, we investigated whether gender and the interaction term condition x gender predicted group membership in the developmental patterns of a negative cognitive style.

Method

Participants

Participants were 1,343 early adolescents (mean age = 13.4 years; *SD* = 0.77; 52.3% females) who have participated in a Randomized Controlled Trial on the effects of a cognitive behavioral therapy based depression prevention program (Kindt, Kleinjan, Janssens, & Scholte, 2014). Schools with at least 30% of their pupils living in low-income areas in the Netherlands were invited to participate in the study, resulting in 11 schools with 57 of their classes participating. Only adolescents from the 1st and 2nd grade of secondary education

(7th and 8th grade in USA) were included. Although 5.2% of the participants were ethnic minority (i.e., they themselves or one of their parents was not born in the Netherlands), all used the Dutch language in school. Based upon the question whether one of their parents had been treated by a psychiatrist, 5.9% of the adolescents showed to have a parent with psychopathology. Permission from the parents for their children's' participation was obtained through passive consent. The project was approved by the ethical committee of the university (ECG13042011).

Procedure

The adolescents were randomized to the research conditions on class level, which resulted in 49.7% (n = 667) of the adolescents being allocated to the intervention condition, and 50.3% (n = 676) to the control condition. Adolescents in the intervention condition received the 16-lessons depression prevention program Op Volle Kracht from their teacher during school hours, in which they were taught cognitive behavioral techniques to counter a negative cognitive style, and to enhance social and coping skills (see Kindt, van Zundert, & Engels, 2012, for more detailed information). Adolescents in the control condition only received the regular school curriculum. All adolescents for whom we had passive parental consent completed self-report questionnaires on computers during school hours in four assessment waves with six months' intervals: baseline, post-intervention and two follow-ups. The participation rates were high at baseline and at post-intervention (T1: 93.7% and T2: 85.8%), with dropouts due to sickness and decreased motivation to participate. Due to a change of schools, 12.3% of the adolescents dropped out between T2 and T3, and the participation rates decreased to an acceptable rate of 72.5% and 74.5% at respectively T3 and T4.

Measures

Negative cognitive style. Negative cognitive style was assessed with the Adolescent Cognitive Style Questionnaire (ACSQ; Hankin & Abramson, 2002). The ACSQ provides adolescents with hypothetical negative life event scenarios. To ensure an optimal cultural fit, we used seven of the 12 negative scenarios of the original scale. The seven selected scenarios were "you take a test and get a bad grade", "someone says something bad about how you look", "your boyfriend/girlfriend breaks up with you, but you still want to stay together", "you want a boyfriend/girlfriend but you don't have one", "you get a bad report card for the semester", "you want to go to a big party, but nobody invites you" and "you get in a big fight with your parents". For each scenario, the participants were asked to rate their agreement whether the cause of the event was internal (i.e., caused by oneself), stable (i.e., the cause remains over time), and global (i.e., the cause will also influence other situations). Subsequently, the participants rated the likelihood to which they believed that future negative consequences would happen due to the event, and rated their agreement on whether the scenario showed the person's self is flawed. Adolescents indicated their agreement with each item on a 7-point Likert-scale, ranging from 1 to 7 (e.g. from "the

cause of the event will never again cause me to get a bad test grade"[1], to "the cause of the event will also cause me to get bad test grades in the future" [7]). A higher score represented a more negative cognitive style. The total score of the questionnaire was used for the analyses. The ACSQ has good psychometric properties and is a recommended assessment tool for measuring cognitive vulnerability (Lakdawalla, Hankin & Mermelstein, 2007). Excellent internal consistency and good test-retest reliability were reported by Hankin and Abramson (2002). In the current study, the alpha coefficients were 0.95, 0.97, 0.98 and 0.98 at T1 to T4 respectively.

Strategy of analyses

We reported means and standard deviations for the total score on negative cognitive style, and separately for condition and gender at each assessment point. Independent t-tests were conducted to test baseline differences in negative cognitive style between the two conditions and between boys and girls.

In line with how we tested the intervention effect on depressive symptoms, we analyzed the intervention effect on negative cognitive style at one-year follow-up (T4), while controlling for baseline negative cognitive style, gender and nestedness within classes, using a multivariate regression analysis in Mplus 5.1 (Muthén & Muthén, 2007). Additionally, we tested the moderating effect of gender by computing the interaction effect with condition.

To empirically derive classes of adolescents with distinct growth trajectories for a negative cognitive style, we applied Latent Class Growth Analyses (LCGA; Nagin, 1999) using the software package Mplus 5.1 (Muthén & Muthén, 2007). In LCGA, latent classes of adolescents are derived from similar individual development trajectories based upon intercept and slope. The intercept represents the estimation of the initial score on negative cognitive style, whereas the slope represents the estimation of the rate of change over time. We determined the best solution for the number of latent trajectory classes (from here on referred to as trajectories) across the three follow-up measurements by considering parsimony, interpretability and four fit indices (Jung & Wickrama, 2008). The first two fit indices are the Bayesian information criterion (BIC) and Akaike information criterion (AIC), for which lower values indicate a better fit (Kass & Wasserman, 1995). Third, a significant Lo-Mendell-Rubin adjusted likelihood ratio (LMR-LRT; $p < 0.05$) indicates a better fit for a model with k +1 classes compared to a model with k classes (Lo, Mendell & Rubin, 2001). Finally, the fit index Entropy provides a number between 0 and 1 based upon the posterior probabilities, with a value closer to 1 representing higher classification quality. Missings were handled with the Full-Information Maximum Likelihood (FIML) approach in Mplus to make optimal use of the data.

To determine whether condition and gender predicted trajectory membership, we performed multinomial logistic regression analyses with trajectory membership as the categorical outcome variable, while controlling for baseline negative cognitive style (T1). The posterior probabilities, estimating the probability to be assigned to a trajectory, were

added as weights before conducting multinomial regression analyses (cf Kleinjan et al., 2012). Moreover, we added the interaction terms of gender and condition to examine moderation effects.

Results

Descriptives

Means and standard deviations for the total negative cognitive style, and separately for condition and gender, are presented in Table 1. Independent t-tests showed that baseline scores of negative cognitive style did not significantly differ for condition and gender ($p = 0.48$ and $p = 0.83$).

Main effect

We did not find a main effect at 12 months follow-up for the OVK intervention on negative cognitive style ($\beta = -1.09$, SE = 0.14, $p = 0.45$), and gender did not moderate this effect ($\beta = 0.12$, SE = 0.15, $p = 0.41$).

Latent Class Growth Curve modeling

Using FIML, all cases with at least one measurement were used for estimating the number of latent classes, resulting in a sample of $N = 1246$. The values for the fit indices AIC, BIC, Entropy, and LMR-LRT for models with one to six trajectories are shown in Table 2.

The fit indices BIC and AIC decreased when the number of classes increased, indicating that a model with more classes fitted the data better. In addition, the Entropy indicated that a solution with six classes fitted the data better than a solution with five or less classes. However, the LMR-LRT revealed the strongest improvement when a four-class solution was compared to a three-class solution. Based on these fit indices, we explored the interpretability of the four- and six- class solutions. Both solutions revealed the trajectories *normative*, *stable high, increasing* and *decreasing*, and the six-class solution revealed two additional trajectories, which we labeled *strongly increasing* and *strongly decreasing*. Although these two additional trajectories had a steeper slope compared to the *increasing* and *decreasing* trajectories, both revealed to be small subtypes and consisted of less than 10 participants, which is a proportion of less than 1% of the total sample. Since we aimed to avoid over-extraction, and the parsimonious four-trajectory model showed clear distinctive groups, we choose the four-trajectory solution to use for further analysis. In the four-class model, the majority (60.8% of the sample, $n = 758$) was estimated to have a stable trajectory of a negative cognitive style around a mean score of 1.4, which we labeled *normative*. The second and third trajectory were referred to as *increasing* and *decreasing*, and consisted of 18.3% ($n = 228$) and 10.7% ($n = 133$) of the sample, respectively. The fourth trajectory, representing 10.2% of the sample ($n = 127$), was

Table 1 Mean Scores (and Standard Deviations) Negative Cognitive Style, and Separately for Condition and Gender.

Variable	T1	T2	T3	T4
Negative cognitive style	1.87 (0.92)	2.02 (1.07)	2.07 (1.19)	2.10 (1.18)
Intervention condition	1.84 (0.91)	2.05 (1.11)	2.08 (1.18)	2.11 (1.24)
Control condition	1.90 (0.93)	1.98 (1.03)	2.07 (1.20)	2.08 (1.13)
Boys	1.88 (0.98)	2.04 (1.17)	2.10 (1.29)	2.06 (1.21)
Girls	1.87 (0.87)	2.00 (0.97)	2.05 (1.10)	2.13 (1.16)

Table 2 Fit Indices for different Latent Class Growth Analysis Models.

No. Of trajectories	AIC	BIC	Entropy	LMR-LRT
1	9378.7	9394.0	-	-
2	8733.7	8764.5	0.75	621.9 ($p = 0.000$)
3	8619.5	8665.6	0.75	114.9 ($p = 0.034$)
4	**8511.4**	**8573.0**	**0.75**	**108.9 ($p = 0.014$)**
5	8394.7	8471.6	0.78	117.2 ($p = 0.091$)
6	8322.0	8414.3	0.80	75.25 ($p = 0.022$)

Note: AIC= Akaike Information Criterion; BIC = Bayesian Information Criterion; LMR-LRT = Lo-Mendell-Rubin adjusted Likelihood Ratio Test. The chosen model is indicated with boldface.

labeled *stable high* and was estimated to have a stable mean score around 3.9. The average latent class probabilities were satisfactory and ranged between 0.70 and 0.91. Table 3 depicts the intercepts, slopes and posterior probabilities for each of the classes of the four-class model, and Figure 1 shows the visual representation of the four estimated trajectories.

Table 3 Mean Intercepts and Slopes, and Posterior Probabilities of Latent Trajectories.

Latent Trajectory	Intercept	Slope	Posterior probability
Normative	1.46**	-0.037*	0.79
Increasing	1.93**	0.753**	0.70
Decreasing	3.31**	-0.730**	0.91
Stable high	3.91**	-0.047	0.84

Note: * $p < 0.01$ ** $p < 0.001$.

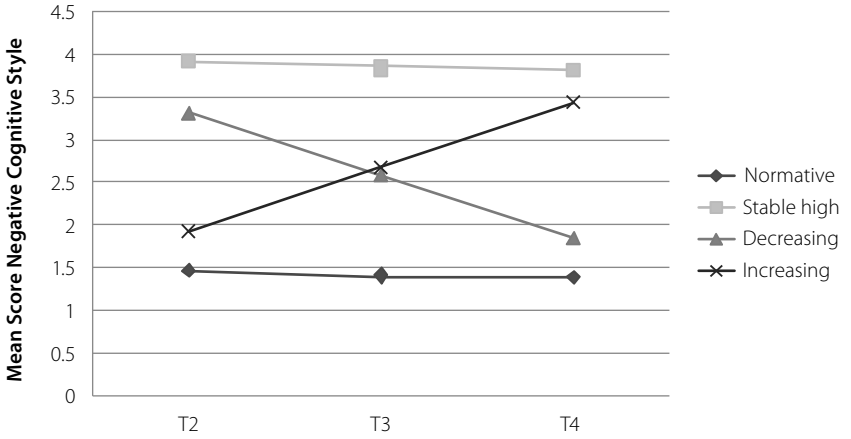


Figure 1 Negative Cognitive Style Trajectory Classes.

Predictors of trajectory membership

The percentages of adolescents per latent trajectory, and separately for the intervention and control condition, and for boys and girls are presented in Table 4. We conducted multinomial logistic regression analyses to examine whether condition, gender, and the interaction between these variables predicted trajectory membership. To examine the first hypothesis that, compared to adolescents from the control condition, the adolescents from the depression prevention condition would relatively more often show a *normative* trajectory than an *increasing* trajectory, we used the *increasing* class as the reference category. Likewise, to examine the second hypothesis that, compared to adolescents from the control condition, the adolescents from the depression prevention condition would relatively more often show a *decreasing* trajectory than a *stable high* trajectory, we used the *stable high* class as the reference category. The *normative* and the *increasing* trajectories are compared because both have low scores on negative cognitive style post-treatment, while the *decreasing* and *stable high* trajectories both have high scores on negative cognitive style post-treatment. The results of the multinomial regression analyses are presented in Table 5 and show that condition was not a significant predictor for trajectory membership when the *increasing* trajectory was used as the reference category. Yet, compared to adolescents from the control group, adolescents from the depression prevention group were marginally less often classified in a *normative* trajectory ($p = 0.069$) compared to an *increasing* trajectory, although findings were not significant at a 0.05-level. There was no significant difference between conditions in the relative proportions of adolescents classified to a *decreasing* trajectory compared to a *stable high* trajectory. Gender and the interaction between gender and condition did not predict trajectory membership.

Table 4 Percentages of Adolescents per Latent Trajectory, and Separately for Condition and Gender.

	Normative	Increasing	Decreasing	Stable high	
	%	%	%	%	n
Total	60.8	18.3	10.7	10.2	1246
Control condition	63.4	17.2	8.2	11.1	610
Intervention condition	58.5	19.0	12.7	9.7	636
Boys	59.4	17.1	11.9	11.5	589
Girls	62.3	19.0	9.3	9.4	657

Table 5 Multinomial Logistic Regression Predicting Trajectory Membership.

		Condition			Gender			Condition x gender		
Trajectories compared		*Wald Test Statistic*	*OR*	*95% CI*	*Wald Test Statistic*	*OR*	*95% CI*	*Wald Test Statistic*	*OR*	*95% CI*
Normative	Increasing	3.30	0.75†	0.55-1.02	0.32	0.89	0.58-1.35	1.12	.40	0.75-2.61
Decreasing	Stable high	1.03	1.29	0.79-2.12	1.77	1.16	0.59-2.29	0.09	.17	0.43-3.17

Note: † $p < 0.10$

Discussion

The current study showed that adolescents receiving the depression prevention program did not differ in their mean negative cognitive style compared to the control group at one year after the intervention. As such, we may conclude that OVK does not impact adolescents' negative cognitive style, and this absence of effect on negative cognitive style may have contributed to the lack of effect of the depression prevention program on depressive symptoms (Kindt et al., 2014). However, we also confirmed four distinctive developmental trajectories of negative cognitive style (*normative*, *increasing*, *decreasing*, *and stable high*), and although condition did not significantly predict the probability of trajectory membership, a trend was found. More precisely, compared to adolescents in the control condition, adolescents that followed the depression prevention program tended to less often show a *normative* trajectory than an *increasing* trajectory. Although these findings provide indications that OVK may have an iatrogenic effect on the development of negative cognitive style, no differences were found between the control and intervention condition when comparing the proportions of adolescents in the *stable high* trajectory and *decreasing* trajectory. Furthermore, gender did not predict group membership, neither as a single predictor nor in interaction with condition.

Latent trajectories

The four latent trajectories of developmental patterns of negative cognitive style - *normative*, *increasing*, *decreasing*, *and stable high*- are comprehensible and for the most part in line with earlier research. In agreement with a previous study on negative cognitive style trajectories in young adolescents (Mezulis et al., 2011), we found the trajectories *normative*, *increasing* and *decreasing*. Moreover, as is also found in previous research (Mezulis et al., 2011), the majority of adolescents had a *normative* trajectory (61% in the current study, 71% in Mezulis and colleagues' study), and the proportions adolescents having an *increasing* and *decreasing* trajectory were considerably smaller (18% of the sample in the current study, and 22% in Mezulis' study showed an *increasing* trajectory; 11% of the adolescents in the current study, and 7% in Mezulis' study showed a *decreasing* trajectory). However, in contrast to the earlier study, we additionally found a fourth trajectory, which we named *stable high*. The adolescents with a *stable high* trajectory were characterized with a high negative cognitive style at post-treatment, and a remaining high negative cognitive style during the follow-ups. The finding of the *stable high* and the *normative* trajectories corroborates previous findings suggesting that a cognitive style develops into a more trait-like characteristic of a person from early adolescence (Cole et al., 2008), and adds to the literature that also young adolescents can have a stable high negative cognitive style, like was previously found in transition from late adolescence to adulthood (Romens et al., 2009). On the contrary, the findings of the groups of adolescents with *increasing* and *decreasing* trajectories suggested that these latter two subgroups have a changing cognitive style over time.

The subgroup of adolescents with a *stable high* trajectory revealed to have a distinctive developmental pattern and is theoretically explicable, what makes it remarkable that this trajectory was not found in previous research on development of a negative cognitive style. One reason may be that in previous research the three-class solution with the *normative*, *increasing* and *decreasing* trajectories resulted in a better model fit than a four-class solution with an additional *stable high* trajectory, because the *stable high* trajectory represented a splinter subtype in a small sample size of $N = 366$ (Mezulis et al., 2011). However, in the current the study the subgroup with a *stable high* trajectory represented nearly the same proportion of adolescents as the subgroup with a *decreasing* trajectory (10% versus 11% respectively). As the *decreasing* subgroup was also found in Mezulis and colleagues their study, and contained a comparable proportion of the sample as in our study (11% in our study, versus 7% in Mezulis' study), it can be expected that the subgroup *stable high* would also have represented an equally sized subgroup as the *decreasing* group, and as such it should also have been found in their study. Yet, the difference might be explained by sample characteristics, as in the current study we used a selective population of adolescents from low-income areas in the Netherlands, in which a subgroup of adolescents with a *stable high* trajectory may be larger and easier to distinguish. Another reason why the *stable high* trajectory was not found in Mezulis' study,

could be that this subgroup was smaller due to a different time interval that was used. In the current study we used a one-year interval, while Mezulis used a four-years interval. A *stable high* trajectory could be less prominent during a four-years interval than during a one-year interval, because there is more opportunity for changes to occur in negative cognitive style, what may result in a decrease in the size of the subgroup with a *stable high* trajectory over time.

Effect OVK on negative cognitive style

Contrary to our hypothesis, we found that OVK was not successful in changing a negative cognitive style. First of all, the reason why we did not found differences between the control and intervention condition when comparing the proportions of adolescents in the *stable high* trajectory and *decreasing* trajectory, may be explained by a limited effect of a universal depression prevention program due to a floor effect for negative cognitive style. In other words, because the majority of the sample does not have room for improvement, as only a relative little subgroup of the adolescents have a highly negative cognitive style to start with, it is difficult to demonstrate an intervention effect. This especially explains why a decreasing pattern was less likely to be reached by the program in this sample with a low negative cognitive style and normative depressive symptoms. Confirmation of the suggested floor effect can be found in the fact that also other universal depression prevention programs failed to show changes in a negative cognitive style (Roberts et al., 2010; Sawyer et al., 2010; Spence, Sheffiels, & Donovan, 2005).

Moreover, compared to the control group, adolescents from the intervention group were marginally less likely to have a *normative* trajectory compared to an *increasing* trajectory. Although these results were not significant and should be interpreted with caution, the trend might reveal the opposite of the intended goal of the prevention program. A depression prevention program will make the adolescents more aware about their negative cognitive style, with the purpose that this increased awareness combined with taught cognitive restructuring skills will eventually result in a stable normative cognitive style (Collins & Dozois, 2008). Based on the findings of the current study, we could conclude that we should be careful to teach cognitive restructuring skills to adolescents from a community sample, as it seems to result in a trajectory of an increasing negative cognitive style for some of them. A reason why the intervention marginally predicted an increase in negative cognitive style may be attributed to an increased attention towards a negative cognitive style, what subsequently could lead to an increased use of a negative cognitive style for at least some of the adolescents. Also, adolescents in the intervention condition are exposed to peers who will report less negative cognitions than they experience themselves, which subsequently may lead them to think that their own negative thoughts are uncommon, what could increase negative cognitions about the self. Another explanation may be that increased awareness of a negative cognitive style will lead to a better recognition of the negative cognitions and a higher report of a

negative cognitive style in self-report questionnaires. The fact that the current study revealed no differences between the intervention and control condition in the proportion of adolescents showing a *decreasing* versus a *stable high* trajectory of negative cognitive style, provides additional evidence that the depression prevention program was not able to change a negative cognitive style as intended.

In summary, based on the current study, the OVK intervention is not likely to reduce or to prevent an increase in negative cognitive style as intended by the depression prevention program. We also did not find significant effects when we examined the sample in depth by separating latent trajectories of the development of a cognitive style. Moreover, the marginally significant trend indicating that, compared to the control group, adolescents in the intervention condition seemed more likely to show a trajectory with an *increasing* negative cognitive style compared to a *normative* cognitive style, may imply the opposite and may indicate that the OVK-program has iatrogenic effects. We like to point the readers' attention to the finding that the majority of the adolescents showed a *normative* trajectory comprising of 61% of the sample, and seemed to be not at risk to develop a negative cognitive style. Yet, the trajectories *stable high* negative cognitive style and *increasing* cognitive style, together accounting for 28% of the sample, suggested that there were two identified groups of youth for which early intervention efforts may be helpful. Knowledge on the existence of different subgroups in development of a negative cognitive style may assist depression prevention researchers to develop effective programs, and help to understand why certain individuals do benefit from depression interventions whereas others do not.

Limitations

First, the sample consisted of adolescents from schools with a high proportion of their pupils from low-income areas, which diminishes the generalizability of the study results to a community population. Second, we only used data on negative cognitive style once every six months over a period of one year. Although this timespan for the intervals is common in depression research (Calvete, Orue, & Hankin, 2013; Gibb & Alloy, 2006; McCarty, Stoep, & McCauley, 2007) and recommended in previous studies (Mezulis, Salk, Hyde, Priess-Groben, & Simonson, 2014), it was unable to capture developmental changes that occurred between measurements. Moreover, we only used three measures that cover a one-year time span in which the mean age of the adolescents increased from 13.4 years to 14.4 years. By consequence, the developmental trajectories of negative cognitive style from adolescence trough adulthood have fallen outside of the scope of this study. Especially because the increase in the rates of depression is found between 13 and 18 years old, with the highest increase from the age of 15 (Hankin et al., 1998), we may have missed an important age-group for estimating the trajectories of the development of a negative cognitive style and for analyzing the effect of the OVK program on a negative cognitive style at the most vulnerable moment. A fourth limitation concerns the sole use

of self-report to assess negative cognitive style. Although assessment of internalizing problems is more reliable by self-reports than parent- or teacher-reports (DiBartolo & Grills, 2006), it is suggested that a negative cognitive style could also be explored by having the teachers of the depression prevention program rate the adolescents' use of the learned cognitive skills (Collins & Dozois, 2008).

Implications for research and practice

As the OVK depression prevention program showed not to be effective in changing a negative cognitive style or to prevent adolescents to develop a negative cognitive style, it is recommended that further research explores the effectiveness of CBT-based programs on negative cognitive style. While more research is needed to confirm whether the four trajectories of negative cognitive style exist in the population, the existence of the subgroups of adolescents with a *stable high* and an *increasing* negative cognitive style trajectory may prove to be of particular interest for understanding an increased chance to develop depression. These subgroups could be used as separate target groups for future research on the effect of CBT-based depression prevention programs, and may also be potential target groups for indicated CBT-based depression prevention.

5

EXAMINING RECIPROCAL ASSOCIATIONS BETWEEN A NEGATIVE COGNITIVE STYLE AND DEPRESSIVE SYMPTOMS IN EARLY ADOLESCENCE

Published as: Kindt, K. C. M., Scholte, R. H. J., Schuck, K., Kleinjan, M., & Janssens, J. M. A. M (2015). Examining Reciprocal Associations Between a Negative Cognitive Style and Depressive Symptoms in Early Adolescence. *International Journal of Cognitive Therapy*, *8*, 78-94.

Abstract

Depressive symptoms tend to increase in adolescence, and have been associated with the development of a negative cognitive style. Cognitive theories postulate that a negative cognitive style precedes the development of depressive symptoms while other theories suggest a negative cognitive style is a consequence. We examined the reciprocal relationship between a negative cognitive style and depressive symptoms over three measurements in a community sample of 720 adolescents (11-15 years; 52.8 % male). Additionally, we examined the moderating effects of gender. An increased negative cognitive style predicted higher levels of depressive symptoms, but not vice versa. These patterns were found consistently and were not moderated by gender**.** The findings suggest that a preexisting negative cognitive style influences the development of depressive symptoms, while a negative cognitive style develops independent of baseline levels of depressive symptoms. These effects do not differ between boys and girls. Theoretical and practical implications are discussed.

Introduction

Depression is a significant mental health concern and has a dramatic influence on people's lives. The life-time risk of experiencing a major depressive episode is estimated at almost 30% (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012), and the prevalence of depression seems to be fairly stable in adulthood (Burns, Butterworth, Luszcz, & Anstey, 2013). Individuals with depression often experienced depressive symptoms for the first time during adolescence (Birmaher et al., 1996; Kim-Cohen et al., 2003), with around 13% of the 13- to 17-year olds reporting a lifetime prevalence of a major depressive episode (Kessler et al., 2012). In addition, a 10-year longitudinal study showed that the rates of depression increase sixfold between the ages 13 and 18 (Hankin et al., 1998). It is important to study the increase in depressive symptoms in young adolescents to gain knowledge about the development of the first depressive symptoms and depression prevention.

A negative cognitive style (i.e., the tendency of an individual to easily generate negative thoughts about events, the self, the world, or the future) is assumed to play an important role in the development of depressive symptoms in adolescents. Meta-analytic reviews have demonstrated significant cross-sectional associations between a negative cognitive style and depressive symptoms in children and adolescents (Gladstone & Kaslow, 1995; Joiner & Wagner, 1995). Various theories have been developed on the relationship between a negative cognitive style and depressive symptoms over time and on whether a negative cognitive style is an antecedent or a consequence of depressive symptoms.

Cognitive theories postulate that a negative cognitive style is an antecedent of depressive symptoms. Two influential cognitive theories are the Hopelessness Theory (Abramson, Metalsky, & Alloy, 1989) and Beck's Cognitive Theory (Beck, Rush, Shaw, & Emery, 1979). Both theories assume a negative cognitive style to be a pre-existing vulnerability to develop depressive symptoms. The Hopelessness Theory (Abramson et al., 1989) distinguishes three domains of negative cognitions that could be used when confronted with a negative life event, namely, negative cognitions regarding the causes of events, the consequences of events, and the self. In Beck's Cognitive Theory (Beck et al., 1979), dysfunctional negative beliefs about the world as well as the relationships with others and the self are hypothesized to make people vulnerable to develop depressive symptoms when they are confronted with a negative life event. Although both cognitive theories are somewhat more complex because they postulate that negative life events interact with the relationship between a negative cognitive style and depressive symptoms, both assume a negative cognitive style to be present prior to depressive symptoms. The cognitive theories were originally developed for adults, but they have also been applied among adolescents. Adolescents have sufficiently developed cognitive abilities to make inferences and display a relatively stable cognitive style (Cole et al., 2008; Hankin, 2008a). A review of 20 longitudinal studies demonstrated that a negative cognitive style, both in interaction with negative life events and alone, predicted an increase in depressive symptoms among 13-to-19-years-old

adolescents (Lakdawalla, Hankin, & Mermelstein, 2007). More recently, longitudinal studies on children and young adolescents showed that a negative cognitive style predicted depressive symptoms, irrespective of the presence of negative life events (Abela & Hankin, 2011; Brozina & Abela, 2006; Calvete, Villardón, & Estévez, 2008; Cole et al., 2008; Cole et al., 2011; Hankin 2008b). Thus, cognitive theories postulate a negative cognitive style as a direct antecedent of depressive symptoms in adolescents as well as indirect antecedent through interaction with life events.

Contrary to the discussed cognitive theories, two theories postulate that a negative cognitive style is a consequence rather than an antecedent of depressive symptoms. First, the Scar Theory postulates that depressive symptoms may have impact on the development of cognitive style as a trait-like characteristic, as it hypothesizes that a negative cognitive style remains as a scar after experiencing a major depressive episode (Lewinsohn, Steinmetz, Larson, & Franklin, 1981). Previous longitudinal studies showed mixed evidence for the Scar Theory in adolescents. In a longitudinal survey study, no evidence was found for a negative cognitive style among 11- to 15-year old girls after recovery from a major depressive disorder (Beevers, Nolen-Hoeksema, Rohde, & Stice, 2007). Yet, support was found in a study in which children with higher levels of depressive symptoms developed an increased negative cognitive style compared to their peers with lower levels of depressive symptoms, and this increased cognitive style remained after the depressive symptoms had subsided (Nolen-Hoeksema, Girgus, & Seligman, 1992). Support was also found in a study of 13-year old girls for whom higher levels of depressive symptoms were predictive of negative cognitions two years later (Mezulis, Funasaki, Charbonneau, & Hyde, 2010). Moreover, in an experimental study in which 13-years olds were confronted with a negative mood induction, only those who had elevated depressive symptoms in the past responded with a more negative cognitive style, and this was not found for their never-depressed peers (Timbremont & Braet, 2004). A second approach why depressive symptoms may lead to a negative cognitive style could be found in biased information processing theory (Bower, 1981; Lerner & Keltner, 2000). This theory postulates that a temporary mood activates thoughts that are compatible with that mood. Thus, a negative mood facilitates the access to negative interpretations and negative cognitions in a state-like mode. The effect of mood on cognitive style has been found in mood induction experiments, which show that participants make more negative causal attributions after a sad mood induction rather than a happy mood induction (Forgas, 1994, 1998). These findings resulted from studies with samples of students or volunteers who were not selected on their level of depressive symptoms and by consequence the majority of them did not experience a depressive episode. As such, these mood experiments indicate that the activation of negative cognitions by mood induction are not only present in individuals suffering from a depressive episode. Although these mood induction studies seem to have focused on a more state-like negative cognitive style, it could indicate that individuals who are relatively more often confronted with a sad mood

will more often use negative cognitions, what could eventually lead to a negative cognitive style with a more trait-like character.

Only a few prospective studies examined the two putative directions of the association between a negative cognitive style and depressive symptoms. Whereas some studies found a reciprocal relationship among children (Gibb & Alloy, 2006), 13-year old adolescents (Calvete, Orue, & Hankin, 2013), and 14- to 18-year old adolescents (Stewart et al., 2004), others found mixed relationships among 15- to 17-year olds (Calvete, 2011). All aforementioned studies used a design with two measurements with a time interval of six months between them. Studies among young adolescents that used a time interval of one year between the assessments found that depressive symptoms predict a negative cognitive style but not vice versa across two waves of measurements (McCarty, Stoep, & McCauley, 2007) and across four waves of measurements (LaGrange et al., 2011). The mixed results of these studies make it difficult to draw firm conclusions about reciprocal associations between depressive symptoms and a negative cognitive style over time. Nevertheless, a negative cognitive style and depressive symptoms start to develop during early adolescence, possibly leading to a reinforcing interplay between a negative cognitive style and depressive symptoms, which might lead to elevated depressive symptoms. We therefore adopted a developmentally appropriate and age-specific longitudinal study design that focuses on this phase of early adolescence. We examined the co-development of an adolescents' negative cognitive style and depressive symptoms by conducting a prospective study with young adolescents from a community sample. We chose for six month intervals because changes in the development of a cognitive style can be expected within this time frame (Calvete et al., 2013; Cole et al., 2011) and more frequent measurement waves would increase the chance of unwanted testing effects (Twenge & Nolen-Hoeksema, 2002). Also, having two instead of one measurements per school year decreases the chances of changes between measurements due to different class characteristics. Moreover, this design allowed us to compare the results with other studies that focused on the development of depressive symptoms and a negative cognitive style over 6-monthly intervals (e.g. Calvete, 2011; Calvete et al., 2013; Gibb & Alloy, 2006; McCarty et al., 2007; Stewart et al., 2004). This study may provide evidence that the development of depressive symptoms, even at relatively low levels, is associated with an increased negative cognitive style or vice versa. Moreover, most studies used a design with only two assessment points and were thus not able to examine whether the observed patterns are robust and consistent over time (Sameroff & Mackenzie, 2003). We therefore used longitudinal data of three assessments to examine the reciprocal relationships between a negative cognitive style and depressive symptoms.

Furthermore, because girls aged 13 or higher are more likely to experience higher levels of depressive symptoms compared to boys (Twenge & Nolen-Hoeksema, 2002), and girls have a more negative cognitive style than boys (Hankin & Abramson, 2002), we investigated whether gender moderated the associations between a negative cognitive

style and depressive symptoms. As far as we know, there is no theory that postulates that the relation between depressive symptoms and a negative cognitive style is different for boys and girls. Yet, it has been examined in previous research, and although previous studies have found that the paths between a negative cognitive style and depressive symptoms are overall very similar for boys and girls, small differences were found for specific negative cognitive styles: Some have found stronger associations for girls (Calvete, 2011; Mezulis et al., 2010), others for boys (Calvete et al., 2013), while others did not find any gender differences (Hankin, 2008b). Regarding the present study, we expected reciprocal relationships between a negative cognitive style and depressive symptoms, and we investigated whether boys and girls differed in these relationships in an exploratory manner.

Method

Participants

The current study was part of a larger longitudinal research project, which utilized an intervention and control condition to investigate the effects of a universal depression prevention program (Tak et al., 2012). Only the participants in the control condition were included in the current study because we aimed to analyze the development of depressive symptoms in a population without potential interference of intervention effects. All participants were recruited from the 2nd grade (8th grade in USA) of four Dutch secondary schools. The sample consisted of 720 adolescents (52.8 % male) with an average age of 13.4 years at first measurement (range = 11-15 years, SD = 0.62). Dutch secondary schools have several educational levels, from preparation for vocational study to preparation for university level. Of the participants, 9.9% attended VMBO (vocational training combined with theoretical education), 42.4% attended HAVO or HAVO-VWO (higher theoretical education), 41.8% attended VWO (preparing for university level), and 5.8% attended 'other education'. The adolescents were mainly of Dutch origin (96% was born in the Netherlands). Of the parents, 90.7% of the fathers and 89.9% of the mothers were also of Dutch origin. With regard to religion, 64,1% reported not to be religious, 26,8% to be Roman Catholic, 4,2% to be Protestant, and 1,0% to be Muslim.

Procedure

The local Ethical Committee of the Faculty of Social Sciences of the Radboud university approved the study. Parents received a letter describing the aims of the project and requesting their passive consent to participate in the study. Children whose parents did not agree with their participation were excluded. Inclusion criteria were being in the 2nd grade of secondary school and being able to read and understand Dutch. In three waves, adolescents completed self-reported questionnaires at school during class time every six months for a period of 12 months. Of the initial sample of 720 adolescents, 97.6%

completed the first measurement and 89.6% and 92.2% completed the second and third measurement, respectively. Missing data were due to adolescents or their parents not willing to participate anymore or because of a change in school.

Measurements

Depressive symptoms were assessed using the Children's Depression Inventory (CDI; Kovacs, 1984). The CDI is a self-report questionnaire comprising 27 items, of which the question regarding suicide was removed to optimize collaboration with school officials and parents. Three statements with increasing severity of affective, cognitive, and behavioral symptoms of depression measure each item. Children select the statement that applied to them best during the last two weeks (e.g., "I feel like crying once in a while", "I feel like crying on many days", "I feel like crying every day"). The answers are measured on a three-point scale ranging from zero to two. Higher scores indicate higher levels of depressive symptoms. The CDI has shown good internal consistency and validity (Saylor, Finch, Spirito, & Bennett, 1984; Timbremont, Braet, & Dreessen, 2004). Cronbach's alpha for the CDI in the current study ranged from .84 to .86 across waves, indicating good internal consistency.

Cognitive style was measured with the Cognitive Bias Questionnaire for Adolescents (CBQA; Tak et al., 2012), which includes two subscales consisting of the cognitive styles of 'causal attributing' (i.e., assuming that stable and global factors cause a negative event to happen) and 'catastrophizing' (i.e., exaggerated negative thoughts about what could happen in the future). These cognitive styles are assessed with five items. The adolescents are asked how often they have a certain thought in a described situation, with possible responses ranging from 'never' (1) to 'very often' (5). Higher values indicate a more negative cognitive style. An example of causal attributing is: The teacher dismisses you from class because you were talking with classmates and you think: "The teacher always picks on me". An example of catastrophizing is: Your best friend behaves a bit strangely to you lately and you think: "I will lose him/her". Cronbach's alpha for the CBQA in the current study ranged from .66 to .76 across administrations for causal attributing and from .70 to .80 for catastrophizing, indicating satisfactory internal consistency. Because the within-time correlations between the two subscales were high (range from .72 to .82), we decided to use cognitive style as a latent variable measured by causal attributing and catastrophizing.

Statistical analyses

We computed descriptive statistics for depressive symptoms and the two negative cognitive styles, causal attributing and catastrophizing, for the three measurements, along with correlations among these variables. We tested baseline differences in depressive symptoms and the negative cognitive styles between boys and girls using independent-sample t-tests. Increases and decreases in depressive symptoms and negative cognitive styles over time were analyzed using one-way repeated measures ANOVA.

To determine whether clustering of participants in schools affected the data, we estimated the between class variation by computing the intra-class correlation coefficients (ICC) for depressive symptoms and negative cognitive styles for all three time-points. The ICC's ranged from .001 to .039, indicating that school differences explain 0.1 to 3.9% of the variance in depressive symptoms and negative cognitive styles. Based on the recommendation by Muthén that the assumption of independent observations is not violated when ICC's are close to zero (Muthén, 1994), we decided not to use multilevel analyses to control for nested data in further analyses.

We applied Structural Equation Modeling (SEM) using Mplus 5 (Muthén & Muthén, 2007) to examine longitudinal associations between the manifest variable of depressive symptoms and the latent variable of a negative cognitive style. Hence, the model included two variables measured at T1, T2, and T3. The stability paths (autoregressive paths) within the constructs were estimated between adjacent time-points. In addition, the cross-lagged paths were estimated to examine the effects between depressive symptoms and negative cognitive style over time (i.e., from T1 to T2 and from T2 to T3). The model included gender and age as covariates at T1. Missing values were handled with Full Information Maximum Likelihood (FIML) estimation. This method was applied to make use of all available data. Model fit was evaluated using the root mean square (RMSEA) and comparative fit index (CFI; Bentler, 1990). Preferably, the RMSEA of 0.5 or lower indicates a good model fit while values between 0.5 and 0.8 indicate a satisfactory fit (Hu & Bentler, 1999). For the CFI, a cut off value close to .95 is needed for a relatively good fit (Hu & Bentler, 1999).

After removing gender as a covariate, multiple group analyses were used to test whether the observed associations between depressive symptoms and the latent variable negative cognitive style differed between boys and girls. Differences in structural paths between boys and girls were tested using the chi-square difference test by comparing the unconstrained model (no constraints on stability or cross-lagged paths across gender) with a constrained model in which cross-lagged paths were constrained to be equal across gender. A significant chi-square test (p-value < .05) would suggest that the two overall models differ significantly, indicating a difference in the relative strength of the associations in the model for boys and girls. As such, cross-lag paths in both directions of the bidirectional model (depressive symptoms -> negative cognitive style, and negative cognitive style -> depressive symptoms) are tested at the same time. When significant differences were to be found, all four cross-lagged paths would be tested individually by comparing an unconstrained model with a constrained model, in which only one path at a time is fixed. We did not examine the latter approach directly, because the chances of obtaining false-positive results (type-I errors) would be highly increased when conducting four pair-wise tests.

Results

Descriptives

Means and standard deviations for depressive symptoms and the two negative cognitive styles for all three waves are reported in Table 1. At baseline, the prevalence of mild depressed mood symptomatology (cutoff score on the CDI ≥ 13) was 14.3% (18.2% in girls and 10.6% in boys), and the prevalence of severe depressed mood (cutoff score on the CDI ≥ 19) was 3.3% (6% in girls and 2.9% in boys). The differences in mean depressive symptoms for boys and girls and the cognitive styles are reported in Table 1 along with their respective t-values. Girls scored significantly higher on depressive symptoms and both negative cognitive styles at the first and second assessment compared to boys. No differences between boys and girls were found at T3.

Table 1 Mean Scores (and Standard Deviations) and Gender Differences in the Variables in the Study.

	Total	Boys	Girls	t-value
T1 Depressive Symptoms	7.71 (5.8)	7.05 (5.1)	8.43 (6.3)	3.14**
T2 Depressive Symptoms	7.72 (6.1)	7.18 (5.8)	8.29 (6.4)	2.28*
T3 Depressive Symptoms	7.88 (6.2)	7.83 (6.8)	7.86 (5.6)	0.07
T1 Catastrophizing	1.96 (.75)	1.89 (.73)	2.04 (.78)	2.56*
T2 Catastrophizing	1.96 (.75)	1.89 (.77)	2.02 (.73)	2.23*
T3 Catastrophizing	1.91 (.77)	1.91 (.84)	1.90 (.70)	-0.12
T1 Causal Attributing	1.99 (.74)	1.87 (.70)	2.12 (.76)	4.46**
T2 Causal Attributing	1.98 (.75)	1.91 (.77)	2.04 (.73)	2.10*
T3 Causal Attributing	1.96 (.75)	1.92 (.81)	7.99 (.68)	1.16

Note: * $p < .05$, ** $p < .01$

Pearson correlation coefficients between depressive symptoms and the two negative cognitive styles across three time-points were all positive and significant (Table 2), indicating that participants reporting an increased negative cognitive style also experienced more depressive symptoms. The correlations among the variables were very similar for T1, T2, and T3. Repeated measures ANOVA showed that the means of depressive symptoms, causal attributing, and catastrophizing did not differ significantly across time-points, indicating that depressive symptoms and the negative cognitive styles remained relatively stable across time sample-wide. Note that this is not necessarily the same within given individuals.

Table 2 Correlations between Depressive Symptoms and the Cognitive Styles of Catastrophizing and Causal Attributing.

	1	2	3	4	5	6	7	8
1 Depressive symptoms T1								
2 Depressive symptoms T2	.59							
3 Depressive symptoms T3	.53	.56						
4 Catastrophizing T1	.68	.39	.35					
5 Catastrophizing T2	.35	.43	.37	.44				
6 Catastrophizing T3	.34	.29	.43	.44	.46			
7 Causal attributing T1	.62	.40	.37	.72	.38	.36		
8 Causal attributing T2	.33	.44	.34	.40	.82	.41	.45	
9 Causal attributing T3	.34	.31	.47	.40	.42	.81	.44	.46

Note: All correlations were significant ($p < .01$ level, 2-tailed).

Structural Equation Modeling

Model fit and auto-regressive paths. Because the normality assumption was violated due to skewness and kurtosis, the parameters in the models were estimated using the Maximum Likelihood estimator with robust standard errors (MLR), which corrects for the non-normality of the model. The model demonstrated reasonable fit to the data, CFI = .93 and RMSEA = .084. As the RMSEA is slightly higher than the recommended .08-threshold, it may indicate that the model is not optimally specified. As displayed in Figure 1, the autoregressive path coefficients indicated that depressive symptoms and the latent factor negative cognitive style are quite stable over time (beta's between .50 and .72).

Cross-lagged paths. We used a cross-lagged analysis to examine the bidirectional associations between depressive symptoms and the latent variable negative cognitive style over time. We found consistent patterns between T1-T2 and T2-T3; negative cognitive style predicted depressive symptoms, but depressive symptoms did not predict negative cognitive style (see Figure 1). Table 3 provides the standardized estimates and the standard errors of the model.

Multiple group analyses that we used to test gender differences revealed no significant decrease in fit after constraining cross-lagged paths compared to a free model ($\Delta\chi2(4) = 7.6$, $p > 0.05$), suggesting no differences between boys and girls in the relative strength of the associations between negative cognitive style and depressive symptoms.

Discussion

The aim of the current study was to examine the reciprocal associations between depressive symptoms and a negative cognitive style in a community sample of young adolescents with low levels of depressive symptoms at baseline. The findings shed light on the early stages of the development of depressive symptoms and a negative cognitive style as well as their inter-relatedness. Although depressive symptoms and a negative cognitive style were cross-sectionally related, we did not find a prospective reciprocal pattern. The findings demonstrated that only an increased negative cognitive style predicted higher levels of depressive symptoms six months later, while higher levels of depressive symptoms did not predict a negative cognitive style. As such, the pre-existing negative cognitive style in young adolescents seemed to influence the development of depressive symptoms, while a negative cognitive style developed independently of the level of depressive symptoms six months earlier. These patterns were consistent across the three measurements over one year, and they did not differ between boys and girls.

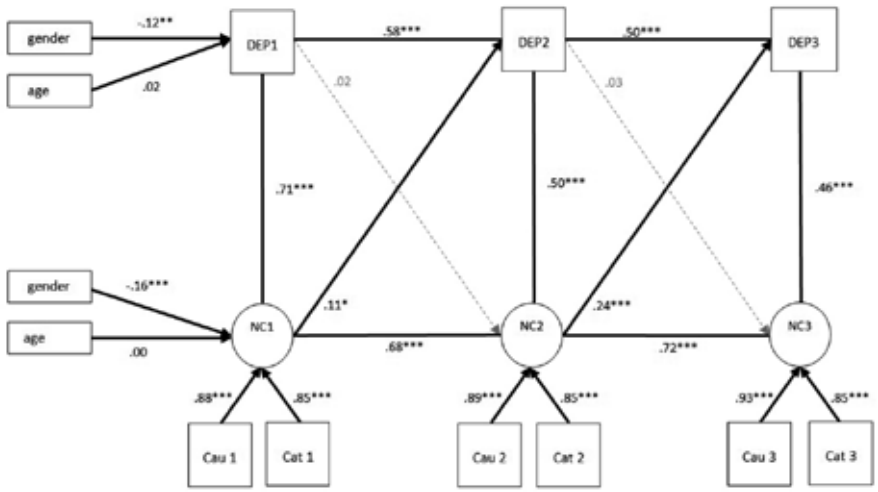


Figure 1 Standardized Path Coefficients for Significant Paths of Full Model.

Note: Numbers denote time points of data collection. All displayed paths with continuous lines are significant at the level of * $p < .05$, ** $p < .01$, *** $p < .001$. NC = Negative Cognitive Style, DEP = Depressive symptoms, Cau = Negative Style Causal Attributing, Cat = Negative Style Catastrophizing. N=720, chi-square value (df=40)=245.6, p=.000, CFI=.93, RMSEA=.084.
Note that the high concurrent associations, as can be found in the Pearson correlation matrix, are controlled for in this model by means of the cross-sectional associations (e.g. controlling for NC2, when examining NC1 → DEP2).

Table 3 Standardized estimates for the model.

	Beta (SD)
Stability paths	
Depressive symptoms T1 → Depressive symptoms T2	0.58 (0.06)**
Depressive symptoms T2 → Depressive symptoms T3	0.50 (0.07)**
Negative cognitive style T1 → Negative cognitive style T2	0.68 (0.08)**
Negative cognitive style T2 → Negative cognitive style T3	0.72(0.07)**
Cross-sectional	
Depressive symptoms T1 - Negative cognitive style T1	0.71(0.03)**
Depressive symptoms T2 - Negative cognitive style T2	0.50(0.05)**
Depressive symptoms T3 - Negative cognitive style T3	0.46(0.06)**
Cross-lagged paths	
Depressive symptoms T1 → Negative cognitive style T2	0.02(0.08)
Depressive symptoms T2 → Negative cognitive style T3	0.03(0.07)
Negative cognitive style T1 → Depressive symptoms T2	0.11(0.06)*
Negative cognitive style T2 → Depressive symptoms T3	0.24(0.56)**

Note: * $p < .05$, ** $p < .001$.

The findings provide support for cognitive theories (Abramson et al., 1989; Beck et al., 1979), which postulate that a negative cognitive style increases depressive symptoms. On the contrary, the findings do not provide support for the biased information processing theories (Bower, 1981; Lerner & Keltner, 2000), and not for the Scar Theory (Lewinsohn et al., 1981). The present study also does not provide support for reciprocal associations between a negative cognitive style and depressive symptoms across time among adolescents, what is inconsistent with previous studies (Calvete, 2011; Calvete et al., 2013; Gibb & Alloy, 2006; Stewart et al., 2004). Seeing that the findings on the interrelations between depressive symptoms and a negative cognitive style in adolescence are inconsistent across our study and previous studies, it may either be that reciprocal associations are not present in this developmental period, or that differences in sample characteristics and methodology are responsible for the differences in findings. Regarding the sample characteristics, adolescents in our study had low levels of depressive symptoms at baseline, which might have been insufficient to elicit a negative cognitive style. According to the Scar Theory, a depressive episode is hypothesized to evoke a negative cognitive style as a scar (Lewinsohn et al., 1981). However, whether a cognitive scar could be left due to the severity or due to the duration of such an episode is not postulated. In the current study, either the severity of depressive symptoms, which is in the normative range for the majority of the adolescents, might not have been high enough, or the duration of the depressive symptoms might not have been long enough, for leaving a

cognitive scar. However, we can only interpret the findings in the light of the severity of the depressive symptoms, since we don't have data on the duration of depressive symptoms. Previous studies showed that depressive symptoms were predictive of a negative cognitive style also in community samples of adolescents (Calvete, 2011; Calvete et al., 2013; Stewart et al., 2004) and that the strength of that relation increased from childhood to adolescence (LaGrange et al., 2011). Yet, only one of those studies included adolescents of the age group similar to the one in the current study (Calvete et al., 2013). However, in that study, the adolescents seemed to have higher levels of depressive symptoms compared to the current study (31% vs. 14.3% of adolescents reported moderate to high depressive symptoms, as defined by the CES-D or CDI, respectively). Although comparison between the two studies can only be made with caution due to the use of different self-report questionnaires, it is possible that a certain minimal level of depressive symptoms is needed to elicit a negative cognitive style.

Another explanation why a reciprocal effect may not have been found could be related to the different auto-correlations of depressive symptoms and a negative cognitive style. We found higher stability across time (i.e., higher standardized autoregressive parameters) for negative cognitive style (beta= .68 - .72) than for depressive symptoms (beta = .50 - .58) (see Figure 1). As such, depressive symptoms had more remaining variability that could be accounted for by other factors compared to negative cognitive style, what makes it is easier to identify significant predictors of depressive symptoms rather than predictors of negative cognitive style. This could mean that, in this age group, depressive symptoms do not influence the development of a negative cognitive style, and a negative cognitive style may be a somewhat more stable characteristic, even at this early age. Cole and colleagues (Cole et al., 2008) indeed found that the stability of a negative cognitive style increases from childhood, and that young adolescents have already developed a trait-like cognitive style.

Our study design could be another reason that we found a negative cognitive style to influence depressive symptoms but not vice versa. The current study covered three time-points of assessment, contrary to previous studies, which found a reciprocal relationship in designs with two time-points (Calvete, 2011; Calvete et al., 2013; Stewart et al., 2004). In order to draw firm conclusions regarding a temporal order between cognitions and depressive symptoms, a more consistent pattern across multiple subsequent periods should be observed (Sameroff & Mackenzie, 2003). When comparing only two measurements, a reasonable possibility exists that both time-varying (e.g., negative life events) and time-invarying (e.g., psychopathology of a parent) confounding factors influence the findings. Because the current findings are based on a pattern that is consistent across three measurements, the occurrence of a time-varying confounding factor is less likely, making the conclusion more reliable. Nevertheless, although the design with three measurements decreased the possibility of a time-varying confounding variable, a time-invarying confounding variable could have moderated the relationship in the present study.

Finally, the present study found no evidence for a moderation effect of gender on the associations between a negative cognitive style and depressive symptoms, indicating that the observed associations are similar for boys and girls. Previous research has found mixed results, with some studies reporting that gender moderated the effects (Calvete, 2011; Gladstone, Kaslow, Seeley, & Lewinsohn, 1997; Hankin 2008b) while other studies did not find moderating effects (Calvete et al., 2013; LaGrange et al., 2011). Other factors are likely to influence the observed gender differences that adolescent girls experience increases in depressive symptoms in adolescence compared to boys (Twenge & Nolen-Hoeksema, 2002). Hankin and Abramson (2001) proposed factors to explain the gender difference in the development of depression. For instance, biological and environmental factors as well as personal vulnerabilities to stress might trigger a negative cognitive style or depressive symptoms. It would be interesting to consider these factors rather than the moderating effect of gender when investigating why girls are more likely to develop depressive symptoms rather than boys.

Limitations

Our study has certain limitations. First, we did not measure several potential moderators. The absence of a main-effect of depressive symptoms on a negative cognitive style could be explained by the omission of potentially important moderator variables. Although we tested the potential moderating effects of gender, testing the moderating effects of additional variables would increase knowledge about possible differences in bidirectional association patterns between depressive symptoms and a negative cognitive style for other subgroups. For example, we were not able to test the viability of the model for adolescents with elevated depressive symptoms because this subgroup was too small for reliable analyses. Also the moderating effects of age were not tested because the group was quite homogeneous, with the majority of the adolescents being 13 (59%) or 14 (35%) years old. Other potential moderators that we did not include in the current study are social support and self-esteem (Abela & Sullivan, 2003), parental psychopathology (Avenevoli & Merikangas, 2006), socioeconomic status (Cardemil, Reivich, Beevers, Seligman, & James, 2007) and life events (Abramson et al., 1989; Beck et al., 1979). With respect to the latter, a negative cognitive style is known to interact with negative life events to predict depression. We suggest the opposite direction might also be true; individuals with higher depressive symptoms could develop a more negative cognitive style based on the amount of 'evidence' they see for explaining their negative mood in negative life events. As such, the amount of life events could have a moderating effect on the relationship from depressive symptoms to a negative cognitive style. Second, a negative cognitive style and depressive symptoms were assessed using self-reports. Although it is known that when assessing internalizing problems, self-reports are more reliable compared to parent- or teacher-reports (DiBartolo & Grills, 2006), and self-reports are indicative of a diagnosis of depression disorder (Sanchez-Villegas et al., 2008), longitudinal research on depression benefits from interviews due to testing effects (Twenge

& Nolen-Hoeksema, 2002). Third, the comparability and generalizability of the current study was hampered by a divergent use of questionnaires compared to other relevant studies on this topic, such as the studies by Calvete and colleagues (2011; 2013). Although the questionnaires about the negative cognitive style were based on the same construct, due to differences in the questionnaire characteristics and measurement errors we were not able to reliably compare the parameters of the models across studies. Moreover, we found high within-time correlations between subscales of the negative cognitive style scale, which is consistent with previous studies (e.g., Calvete, 2011, Hankin & Abramson, 2002). This could indicate that a common construct underlies separate negative cognitive styles. To accommodate for this, we used a latent construct of negative cognitive style estimated from the two subscales. Furthermore, the sample consisted mainly of adolescents with a Dutch origin, which reduces the generalizability of the results to other ethnicities. Finally, by using the CDI questionnaire we have only captured depressive symptoms during the last two weeks prior to the assessment. Our design was not able to grasp the effects that occur between the last assessment up until the two weeks prior to the new assessment. Therefore, we might have missed other changes in depressive symptoms. The cognitive style questionnaire does not refer to a time period for the answering of the question, however, subtle changes in the development of a negative cognitive style may have occurred within a shorter period of time (e.g., daily, weekly, or monthly variations). Although the time lapse of six months between measurements is not uncommon in depression research, a design with more frequent administrations may have had generated different results.

With these limitations in mind, the results of this study may be useful for designing depression prevention programs aimed at improving mental health care for young adolescents. Based on the finding that a negative cognitive style is related to an increase in depressive symptoms, programs should focus on preventing adolescents from developing a negative cognitive style. The existing programs based on the principles of cognitive behavioral therapy (CBT) are assumed to target a negative cognitive style and are known as evidence-based interventions for treatment of depressed adolescents (Vitiello, 2011). Moreover, CBT-based interventions are also used for preventive goals, such as the Penn Resiliency Program (Gillham et al., 2007), and they have been found to reduce the risk for future depressive symptoms (Merry et al., 2012). Hence, CBT-based prevention programs seem to be able to prevent adolescents with low levels of depressive symptoms from developing a negative cognitive style, which in turn could diminish the increase of depressive symptoms. However, whether a negative cognitive style actually functions as a mediator in the relation between CBT and depressive symptoms is still not evident (Stice, Shaw, Bohon, Marti, & Rohde, 2009). The findings of the current study underline the importance of evaluating whether depression prevention programs can effectively target and attenuate the development of a negative cognitive style, which may constitute a working mechanism in the prevention of depression.

In summary, the present study investigated the prospective relations between a negative cognitive style and depressive symptoms over one year in a community sample of 720 young adolescents using a longitudinal design with three measurements. The present study adds to the current literature by demonstrating that a negative cognitive style predicts an increase in depressive symptoms six months later, but not vice versa. This pattern was observed consistently across three waves of assessment. Further longitudinal research with repeated assessments over an extended time period and more variation in the frequency of assessments is necessary to understand the interplay between depressive symptoms and negative cognitions. Moreover, future research would benefit from evaluating the role of life events within the context of the relationship between depressive symptoms and a negative cognitive style. This knowledge may help improve prevention and treatment of depression in the future.

6

CROSS-LAGGED ASSOCIATIONS BETWEEN ADOLESCENTS' DEPRESSIVE SYMPTOMS AND NEGATIVE COGNITIVE STYLE: THE ROLE OF NEGATIVE LIFE EVENTS

Published as: Kindt, K. C. M., Kleinjan, M., Janssens, J. M. A. M., & Scholte, R. H. J. (2015). Cross-Lagged Associations Between Adolescents' Depressive Symptoms and Negative Cognitive Style: The Role of Negative Life Events. *Journal of Youth and Adolescence*, 1-13.

Abstract

Previous research has established that cognitive theory-based depression prevention programs aiming change in negative cognitive style in early adolescents do not have strong effects in universal settings. Although theories suggest that a negative cognitive style precedes depressive symptoms, empirical findings are mixed. We hypothesized that negative cognitive style may not predict depressive symptoms in adolescents with normative depressive symptoms. Depressive symptoms, negative cognitive style and dependent negative life events were assessed in young adolescents (N = 1,343; Mean age = 13.4 years, SD = 0.77; 52.3% girls) at four time points over an 18-month period. Using a cross-lagged panel design, results revealed that depressive symptoms predicted a negative cognitive style but not vice versa. However, when including dependent negative life events as a variable, depressive symptoms did not prospect a negative cognitive style consistently. When dependent negative life events were used as a time-varying covariate, depressive symptoms and a negative cognitive style were not related. We concluded that negative cognitive style is not predictive of depressive symptoms in a community sample of young adolescents. Moreover, the findings suggest that longitudinal relationships between depressive symptoms and a negative cognitive style are not meaningful when dependent negative life events are not considered.

Introduction

Depression causes a significant burden to individuals and brings high costs for society (Sobocki, Jönsson, Angst, & Rehnberg, 2006) and almost 30% of all people experience a major depressive episode in their lives (Kessler, Petukhova, Sampson, Zaslavsky & Wittchen, 2012). As symptoms of depression in adolescence strongly predict depressive episodes in adulthood (Pine, Cohen, Cohen, & Brook, 1999), depression rates strongly increase in adolescence (Hankin et al., 1998), and 13% of the 13- to 17-year olds reported to have experienced a depressive episode (Kessler et al., 2012), depression prevention programs have been developed to decrease the incidence of depression in youth. Most of these prevention programs are based on cognitive theories and teach adolescents skills to change a negative cognitive style into a more realistic, helpful cognitive style (Gillham et al., 2007; Kindt, Kleinjan, Janssens & Scholte, 2014; Pössel, Horn, Groen & Hautzinger, 2004). Modification of a maladaptive cognitive style should thus prevent or restrain the increase of depressive symptoms.

Yet, even though research on cognitive theory-based depression prevention programs for adolescents from community samples shows encouraging results, the effects are small and inconsistent across studies (Merry et al., 2012; Stice et al., 2009). This could imply that these prevention programs do not sufficiently impact or change a negative cognitive style in young adolescents. However, another reason for why cognitive theory-based prevention programs might not show the desired effects could be that a negative cognitive style does not have a major impact on depressive symptoms, or that depressive symptoms drive negative cognitive styles and not vice versa. Increased knowledge about the prospective links between a negative cognitive style and depressive symptoms in early adolescence is essential to understand why cognitive theory-based depression prevention programs only show small effects. Therefore, the aim of this study was to examine the longitudinal, bidirectional relationships between a negative cognitive style and depressive symptoms.

Meta-analytic reviews clearly showed that a negative cognitive style and depressive symptoms are cross-sectionally associated in children and adolescents (effect size = .41 in Gladstone & Kaslow, 1995; average $r = .35$, average $Z = 4.29$, $ps < .0001$ in Joiner & Wagner, 1995). After childhood, these associations become stronger when youth develop a more stable cognitive style (Cole et al., 2008) and show strong improvements in reasoning and abstract thinking (Steinberg, 2005). Previous longitudinal studies have tried to reveal the temporal order of the bidirectional associations between a negative cognitive style and depressive symptoms in adolescents, but so far, findings are mixed. While a previous study showed a negative cognitive style to precede the increase of depressive symptoms, and not vice versa (Kindt, Scholte, Schuck, Kleinjan & Janssens, 2015), other research showed the opposite effect, namely, that depressive symptoms predicted a negative cognitive style (Hankin, Abramson & Siler, 2001; Johnson & Miller, 1990; LaGrange et al., 2011; McCarty, Stoep &

McCauley, 2007; Timbremont & Braet, 2006). Yet, again other research showed bidirectional effects, with depressive symptoms and a negative cognitive style mutually influencing each other over time (Calvete, 2011; Calvete, Orue & Hankin, 2013; Stewart et al., 2004).

There may be two explanations for these contradictory findings – other than differences in design, samples and measurements. The relationship between a negative cognitive style and depressive symptoms could be explained by another variable, or the relationship is spurious due to a confounding variable and disappears after controlling for the confounding variable. Previous longitudinal research has revealed that time-varying factors partly account for the variance of both depressive symptoms and a negative cognitive style (LaGrange et al., 2011).

Negative life events could be such a time-varying variable and might act as a confounding variable and thus alter the link between depressive symptoms and a negative cognitive style. Negative life events are found to be associated with higher levels of depressive symptoms (Hammen, 2005) and a more negative cognitive style (Calvete, 2011; Hankin, 2008b; Hankin, Abramson & Siler, 2001). Although cognitive theories hypothesize that a negative cognitive style is a cause for depressive symptoms, with negative life events acting as a moderator (Abramson, Metalsky & Alloy, 1989; Beck, Rush, Shaw & Emery, 1979), a meta-analytic review on this topic, that included studies with two assessment waves (e.g., Abela & Payne, 2003; Abela & Seligman, 2000; Hankin et al., 2001; Nolen-Hoeksema, Girgus & Seligman, 1992; Southall & Roberts, 2002), showed that the overall interaction effect of a negative cognitive style and negative life events on depressive symptoms was small (partial correlation of 0.22; Lakdawalla, Hankin & Mermelstein, 2007). In addition, recent empirical research showed that the interaction between a negative cognitive style and negative life events did not predict depression until late adolescence (Braet, Vlierberghe, Vandevivere, Theuwis, & Bosmans, 2013). Moreover, these cognitive theories do not explain bidirectional relationships that have been found between negative life events, negative cognitive style and depressive symptoms. A recent study revealed that each variable predicted the others: depressive symptoms predicted a negative cognitive style and negative life events, a negative cognitive style predicted depressive symptoms and negative life events, and negative life events predicted depressive symptoms and a negative cognitive style (Calvete et al., 2013).

As negative life events have thus been found to predict both a negative cognitive style and depressive symptoms (Barrocas & Hankin, 2011), the prospective relationships between depressive symptoms and a negative cognitive style may be altered by the experienced negative life events. As we were specifically interested in the prospective relationship between a negative cognitive style and depressive symptoms, we tested whether this relationship remained meaningful when we included or excluded the role of negative life events in the models.

Life events are divided into independent and dependent life events. Independent life events occur without the influence of the person him- or herself (e.g., divorce of parents),

while dependent life events refer to events to which the person has contributed, and include most interpersonal events (e.g., conflicts; Hammen, 2005). Depressed individuals experience more dependent negative events than independent negative events, and dependent events are highly predictive of depressive symptoms and episodes in adults (Kendler, Karkowski & Prescott, 1999) and adolescents (Auerbach, Bigda-Peyton, Eberhart, Webb & Ringo Ho, 2010; Shih, Eberhart, Hammen & Brennan 2006). Moreover, dependent life events have also been found to be the result of a depressive episode both in a community sample (Patton, Coffey, Posterino, Carlin & Bowes, 2003) and clinically depressed children and adolescents (Rudolph & Hammen, 1999; Rudolph et al., 2000). Because dependent life events are most strongly related to depression, we included these in our study.

The current study

As cognitive-behavioral depression prevention programs in community samples do not show the effects as hoped, teaching adolescents skills to change a negative cognitive style to prevent them from developing depressive symptoms may not be an effective approach. One explanation could be that a negative cognitive style does not precede the depressive symptoms in early adolescents. Although cross-sectional studies established that a negative cognitive style and depressive symptoms are related, few empirical studies used a longitudinal design to reveal the temporal ordering of those associations in adolescence. Empirical studies on the bidirectional relationship between depressive symptoms and a negative cognitive style have shown mixed results. Moreover, these studies have not always included dependent negative life events, while these events could alter or confound the relationship between a negative cognitive style and depressive symptoms. The present study contributes to the field by examining bidirectional relationships between a negative cognitive style and depressive symptoms and the role of dependent negative life events regarding these relationships. We used data that covered four assessments over an 18-month period and that were collected as part of an effectiveness study of a depression prevention program (Kindt et al., 2014).

The associations between a negative cognitive style and depressive symptoms were first analyzed without taking into account the potential role of dependent negative life events, and subsequently we considered dependent negative life events in the analytic models by using two different strategies. First, dependent negative life events were added as a variable to the basic model next to depressive symptoms and a negative cognitive style to analyze temporal relationships between those three variables. This way, we also examined the robustness of the relationship between a negative cognitive style and depressive symptoms when including the temporal influence of dependent negative life events. Second, we added dependent negative life events as a time-varying covariate to the basic model, to control for their confounding impact on the relationship between a negative cognitive style and depressive symptoms. We hypothesized that depressive

symptoms are both preceding and following a negative cognitive style when dependent negative life events were not included. Further, with respect to the two additional analytic models, we hypothesized that the bidirectional associations between depressive symptoms and a negative cognitive style are less prominent when considering the role of dependent negative life events.

Method

Participants

A total of 1,343 adolescents participated in a randomized controlled study on the effectiveness of a depression prevention program. Both participants in the control and intervention condition were included in the analysis, whereby 49.7% of the adolescents received a depression prevention program. All participants were recruited from the 1st and 2nd grade of secondary education in the Netherlands (7th and 8th grade in USA) and the mean age was 13.4 years (SD = 0.77). Of the total group, 52.3% were girls and 52.3% were immigrants (i.e., they themselves or one of their parents were not born in the Netherlands). Because adolescents with parents with psychopathology have an increased risk to develop a depressive disorder (Avenevoli & Merikangas, 2006), we asked adolescents whether their parents had been treated by a psychiatrist. Parental psychopathology was reported by 5.9% of the adolescents, and was controlled for in the analyses.

Procedure

Schools with at least 30% of their pupils living in low-income areas in the Netherlands were approached to participate in the study and eleven schools were willing to participate with 57 classes. Parents of the pupils were notified and had the option to refuse data collection from their child by passive consent. Data were collected at four time points with six-month intervals. The adolescents completed the online self-report questionnaires on school grounds during class time at T1 (December 2011), T2 (June 2012), T3 (December 2012) and T4 (June 2013). The intervention was between T1 and T2. The retention rates at T1 and T2 were high (T1: 93.7% and T2: 85.8%) and drop out was primarily due to sickness or absence. Between T2 and T3, 12.3% dropped out due to change of schools. The participation rates at T3 and T4 were respectively 72.5% and 74.5%. A flowchart can be found in another study (Kindt et al., 2014). Attrition at T4 was analyzed with logistic regression analyses in which dropout was the dependent variable (0 = dropout, 1 = in the study), and gender, condition, depressive symptoms at T1, dependent life events at T1, and negative cognitive style at T1 were the predictors. Adolescents lost to follow-up were more likely to be boys (OR = 1.58 CI 95% = 1.21-2.06, $p < 0.01$), and to have higher depressive symptoms at baseline (OR = 0.96, CI 95% = 0.94-0.99, $p < 0.01$). Condition, dependent life events and negative cognitive style did not predict dropout. The local Ethical Committee of the university approved the study (ECG13042011).

Measurements

Depressive symptoms. Depressive symptoms were assessed with the Children's Depression Inventory (CDI; Kovacs, 1984), which consists of 27 items comprising affective, cognitive and behavioral symptoms of depressive symptoms. The item assessing suicidal ideations was not included in the current study to improve the collaboration with the schools and parents. Per item, adolescents selected one of the three statements that applied best to them in reference to the last two weeks. Scores are rated on a three-point scale from zero to two (e.g., "I feel like crying once in a while" [0], "I feel like crying on most days" [1], "I feel like crying every day"[2]). The total score ranged from zero to 52, with a higher score indicating higher depressive symptoms. The CDI has shown good internal consistency and validity (Evers, van Vliet-Mulder & Groot, 2000). The alpha coefficients in the current study were 0.85, 0.88, 0.90 and 0.90 at T1 to T4 respectively.

Negative cognitive style. Negative cognitive style was assessed with the Adolescent Cognitive Style Questionnaire (ACSQ; Hankin & Abramson, 2002), which is a recommended assessment tool for measuring cognitive vulnerability because of its good psychometric properties (Lakdawalla et al., 2007). The questionnaire presents hypothetical negative life event scenarios. Based on the cultural fit for adolescents from our country, seven of the 12 negative scenarios of the original questionnaire were selected and translated to Dutch by native Dutch health care professionals. To check the content of the Dutch version it was translated backwards by native English professionals. Examples of selected scenarios are "you take a test and get a bad grade" and "you want a boyfriend/girlfriend but you don't have one". The participants were presented with these hypothetical negative scenarios and were asked to rate the degree to which the cause of the event is internal (i.e., caused by oneself), stable (i.e., the cause remains over time), and global (i.e., the cause will also influence other situations). Next, the participants rated the likelihood of future negative consequences due to the event, and rated the extent to which they believe that what happened shows the person's self is flawed. Response scales ranged from 1 to 7, with a higher score representing a more negative cognitive style (e.g., from "the event was caused by something else" [1], to "the event was completely caused by myself" [7]). We used the total score of the questionnaire, as has been done in previous research (e.g., Calvete et al., 2013). The questionnaire displayed excellent internal consistency reliability and good test-retest reliability (Hankin & Abramson, 2002). The alpha coefficients in the current study were 0.95, 0.97, 0.98 and 0.98 at T1 to T4 respectively.

Dependent negative life events. Dependent negative life events were assessed with the Adolescent Life Events Questionnaire – Revised (ALEQ-R; Auerbach et al., 2010). The questionnaire is derived from the ALEQ, which has good validity and reliability (Hankin & Abramson, 2002). The ALEQ-R comprises 29 items of negative life events that are dependent and interpersonal in nature. Examples of items are "you got into a fight or argument with your girlfriend/boyfriend" and "you got in trouble with the teacher or principal". Participants are asked to rate, on a 5-point Likert scale ranging from never (0) to

always (4), how often these dependent negative life events occurred during the past three months. Total scores range from zero to 116 with higher scores reflecting more negative life events. Cronbach's alphas in the current study were 0.89, 0.94, 0.94 and 0.96 at T1 to T4 respectively.

Statistical analyses

Descriptive statistics were obtained and Pearson correlations were computed for all variables included in this study. We tested baseline differences in depressive symptoms, negative cognitive style and dependent negative life events for age, gender, parental psychopathology, and immigration status using independent-samples t-tests, which provided us with information about which variables were to be included as covariates in the model.

We applied structural equation modeling using the software package Mplus 5.1 (Muthén & Muthén, 2007) to examine longitudinal relationships between depressive symptoms and a negative cognitive style. To make optimal use of the data, we handled missing values with the Full-Information Maximum Likelihood (FIML) approach in Mplus. In the basic cross-lagged model, we examined a path diagram that included the paths between the four adjacent measurements of depressive symptoms and negative cognitive style (i.e. autoregressive paths), the associations between measurements of depressive symptoms and negative cognitive style per time point (i.e. cross-sectional associations), and the paths between the two distinct constructs across adjacent time points (i.e. cross-lagged paths). The cross-lagged paths (e.g., between depressive symptoms T1 and negative cognitive style T2) were estimated to examine the effects over time.

In the second model, we added dependent negative life events as a variable next to depressive symptoms and negative cognitive style to analyze the temporal relationships between these three variables. In the third model we added dependent life events as a time-varying covariate to the basic model, by which we controlled for the cross-sectional role of dependent negative life events at each time-point. The parameters in the models were estimated with maximum likelihood estimation with robust standard errors (MLR) to accommodate for skewness of the data. To control for the possible impact of nestedness of the data within classes, we used the Type is Complex option in Mplus. The root mean square (RMSEA, preferably .05 or lower, and satisfactory between .05 and .08), and the comparative fit index (CFI, preferably .95 or higher) served as model fit indices (Hu & Bentler, 1999; Iacobucci, 2010).

We used multi-group analyses in Mplus for all three models to test whether the observed cross-lagged associations were moderated by intervention condition and gender. We used the chi-square difference test and compared the unconstrained model (no constraints on cross-lagged paths) with a constrained model in which cross-lagged paths were constrained to be equal. We first constrained all cross-lagged paths simultaneously. A difference in the relative strength of the associations (i.e. moderation

effect) would be present for the overall models when a significant chi-square test (p-value < .05) would be found. In that case, each cross-lagged path would be tested separately to examine which specific paths would be moderated by condition or gender.

Results

Descriptives

Table 1 displays the means and standard deviations for all measurements. The sample average of depressive symptoms ranged from 8.5 to 9.5 across assessments, which is in the normative range (Timbremont, Braet & Dreessen, 2004). At baseline, 7.2% of the adolescents scored within the clinical range (CDI > 19). Table 1 also depicts the correlations among all assessment points of depressive symptoms, negative cognitive style and dependent negative life events. All correlation coefficients were significant and positive, indicating that higher depressive symptoms were associated with a more negative cognitive style and associated with more dependent negative life events.

We conducted t-tests on the baseline scores of depressive symptoms, negative cognitive style and dependent negative life events to see whether they differed with regard to age, gender, parental psychopathology and immigration status. The baseline depressive symptoms were higher for girls than for boys (9.00 versus 8.07, $p < .05$) and for adolescents whose parents were reported to have psychopathology compared to adolescents whose parents were not reported to have psychopathology (11.89 versus 8.34, $p < .001$). Baseline depressive symptoms did not differ with regard to immigration status or age. Baseline negative cognitive style was higher for adolescents with parents with psychopathology compared to those with parents without psychopathology (2.16 versus 1.86, $p < .01$), and for native Dutch adolescents compared to immigrants (1.96 versus 1.80, $p < .01$), but did not differ for age and gender. Baseline dependent negative life events were higher for girls than boys (13.95 versus 11.42, $p < .001$), and higher for adolescents with parents with psychopathology compared to those with parents without psychopathology (20.6 versus 12.24, $p < .001$), but did not differ with regard to age and immigration status. No baseline differences on depressive symptoms, a negative cognitive style and dependent negative life events were found for age. Yet, based on significant Pearson correlations of age with baseline depressive symptoms and dependent negative life events, we decided to control for age next to gender, parental psychopathology, immigration status and condition.

Table 1 Pearson Correlations among Depressive Symptoms, Negative Cognitive Style and Life Events, and Means and Standard Deviations.

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. Depressive symptoms t1												
2. Depressive symptoms t2	.58											
3. Depressive symptoms t3	.53	.57										
4. Depressive symptoms t4	.41	.45	.57									
5. Negative cognitive style t1	.44	.25	.25	.16								
6. Negative cognitive style t2	.26	.43	.31	.27	.35							
7. Negative cognitive style t3	.25	.29	.46	.28	.36	.50						
8. Negative cognitive style t4	.26	.25	.28	.44	.31	.40	.45					
9. Life events t1	.59	.35	.31	.28	.38	.25	.20	.21				
10. Life events t2	.41	.67	.47	.34	.25	.47	.30	.23	.46			
11. Life events t3	.35	.42	.62	.35	.26	.38	.48	.29	.38	.54		
12. Life events t4	.28	.34	.37	.56	.19	.28	.28	.43	.34	.43	.46	
Mean	8.55	9.47	9.64	9.62	1.88	2.01	2.07	2.10	12.74	15.77	16.02	16.40
SD	6.51	7.72	8.19	8.48	.93	1.07	1.19	1.18	11.12	15.69	15.97	17.47

Note All correlations are significant at the 0.01 level (2-tailed).

Relationships between depressive symptoms and a negative cognitive style over time

Figure 1 displays the results of the basic cross-lagged model among depressive symptoms and a negative cognitive style. The model demonstrated reasonable fit to the data, CFI = .90 and RMSEA = .056. The notion that the CFI is a little lower than the recommended threshold of .95 might indicate that the model is not optimally specified. The autoregressive path coefficients were significant indicating that depressive symptoms and negative cognitive style had a significant stability over time. Cross-sectional associations between depressive symptoms and negative cognitive style were significant and positive. Most importantly, across all four measurements, we found significant and positive associations for the cross-lagged paths from depressive symptoms to negative cognitive style, indicating that higher depressive symptoms predicted an increase in negative cognitive style six months later. Negative cognitive style did not predict depressive symptoms six months later. Multi-group analyses revealed no differences in cross-lagged paths for intervention condition ($\Delta\chi2(6) = 9.0$, $p > 0.05$), but did show differences for gender ($\Delta\chi2(6) = 20.7$, $p = 0.002$). Additional multi-group analyses per cross-lagged path for gender revealed that only the cross-lagged path from depressive symptoms at T3 to negative cognitive style at T4 differed ($\Delta\chi2(1) = 794.4$, $p = 0.000$), showing standardized beta's of -.02 for boys and .22 for girls. Higher depressive symptoms at T3 predicted a higher negative cognitive style at T4 in girls, but not in boys.

Relationships between depressive symptoms, a negative cognitive style and dependent negative life events over time

Dependent negative life events were added to the model and showed positive associations with depressive symptoms and negative cognitive style at all time points, as is shown in Figure 2.

The autoregressive paths and cross-sectional paths were all positive and significant. Compared to the basic model in which the variable dependent negative life events was not included, only the cross-lagged path from depressive symptoms to negative cognitive style between T1 and T2 remained significant, while the cross-lagged paths between T2-T3 and T3-T4 disappeared. Negative cognitive style did not predict depressive symptoms at any time point. Significant cross-lagged paths were revealed between depressive symptoms and dependent negative life events. Depressive symptoms at T1 predicted negative life events at T2, with the latter predicting depressive symptoms at T3. Finally, depressive symptoms at T3 predicted negative life events again at T4. Two significant cross-lagged paths revealed between a negative cognitive style and dependent negative life events: dependent negative life events at T1 predicted negative cognitive style at T2, and the latter predicted dependent negative life events at T3. The findings do not indicate a mediating role for dependent negative life events in the relationship between a negative cognitive style and depressive symptoms. Multi-group analyses showed that gender and condition did not have moderating effects.

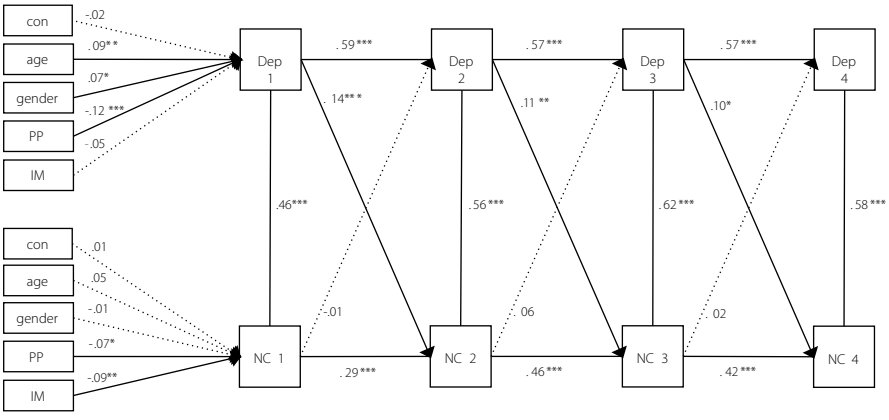


Figure 1 Cross-lagged Model among Depressive Symptoms and a Negative Cognitive Style.

Note: The model provides standardized parameters. * $p < .05$, ** $p < .01$, *** $p < .001$ Dep = Depressive symptoms, NC = Negative cognitive style, PP = Parental psychopathology, IM = Immigration status, Con = study condition. RMSEA = .052, CFI = .90, Chi-square = 1562.5 (df = 68; $p = .000$)

Relationships between depressive symptoms and a negative cognitive style over time with dependent negative life events as a time-variate covariate

We created the third model by adding dependent negative life events as a time-varying covariate to the basic model (see Figure 3). Dependent negative life events showed significant and positive associations with depressive symptoms and negative cognitive style at all time points. Of the variables that were controlled for at baseline, none remained associated with baseline depressive symptoms, and only immigration status was still associated with baseline negative cognitive style showing that native Dutch adolescents had a more negative cognitive style. The autoregressive path coefficients remained significant, although in the model with dependent negative life events as a time-variate covariate they seem to have lower values compared to the basic cross-lagged model in which dependent negative life events were not included (for depressive symptoms ranging from .41 to .44 compared to ranging from .57 to .59 in the basic model; and for negative cognitive style ranging from .26 to .38 compared to ranging from .30 to

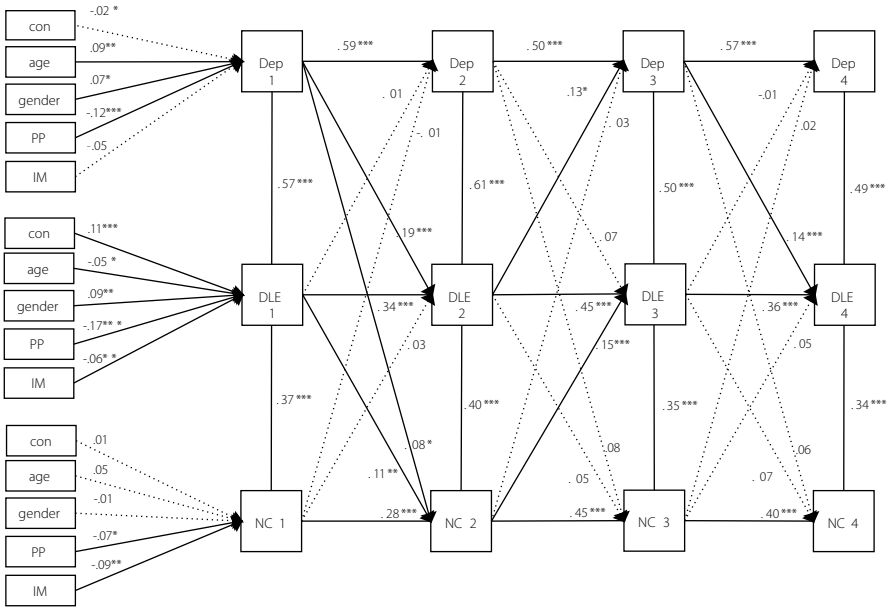


Figure 2 Cross-lagged Model among Depressive Symptoms, a Negative Cognitive Style and Dependent negative Life Events.

Note: The model provides standardized parameters. * $p < .05$, ** $p < .01$, *** $p < .001$. Dep = Depressive symptoms, DLE = Dependent negative Life Events, NC = Negative cognitive style, PP = Parental psychopathology, IM = Immigration status, Con = study condition. RMSEA = .048, CFI = .94, Chi-square = 292.4 (df=72; $p = .000$)

.46 in the basic model). The cross-sectional associations between depressive symptoms and a negative cognitive style remained significant, although the standardized parameters decreased from ranging between .37 and .43 in the basic cross-lagged model to ranging between .19 and .28 in the model in which dependent negative life events were addes as time-varying covariates. Most importantly, none of the cross-lagged paths remained significant, indicating that when we controlled for dependent negative life events, depressive symptoms were not related with a negative cognitive style over time, or vice versa. Multi-group analyses showed that gender and condition did not have moderating effects.

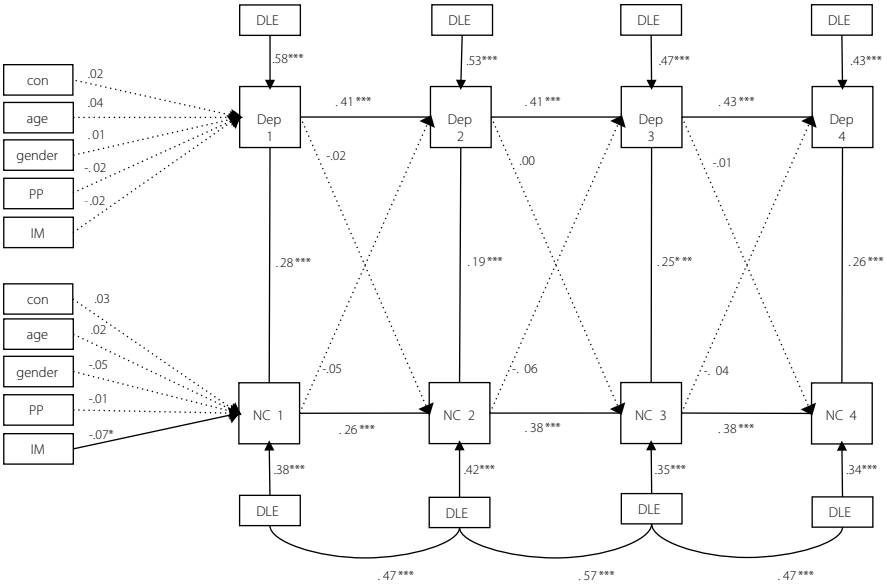


Figure 3 Cross-lagged Model among Depressive Symptoms and a Negative Cognitive Style with Dependent Negative Life Events as a Time-varying Covariate.

Note: The model provides standardized parameters. * $p < .05$, ** $p < .01$, *** $p < .001$. Dep = Depressive symptoms, NC = Negative cognitive style, PP = Parental psychopathology, IM = Immigration status, Con = study condition, DLE = Dependent negative Life Events. RMSEA = .052, CFI = .91, Chi-square = 386.406 (df=84; $p = .000$)

Discussion

Because high levels of depressive symptoms preceed the onset of a depressive disorder, which is the most serious mental health problem in adolescence (Birmaher, Arbelaez, & Brent, 2002), and depressive symptoms in adolescence are known to be predictive for

major depressive episodes in adulthood (Pine et al., 1999), prevention of depressive symptoms in adolescence is of importance to improve mental health care. So far, the efforts have mainly been focused on cognitive-therapy based depression prevention in early adolescence, as from late childhood into middle adolescence, individuals develop a more stable cognitive style and are capable of abstract thinking (Cole, 2008; Steinberg, 2005). Yet, cognitive-therapy based depression prevention programs in adolescents in a community setting have only showed small effects (Merry et al., 2011). Because research showed mixed findings on the relationships between depressive symptoms and a negative cognitive style in adolescents (Calvete, 2011; Calvete et al., 2013; Hankin et al., 2001; Johnson & Miller, 1990; Kindt et al., 2015; LaGrange et al., 2011; McCarty et al., 2007; Stewart et al., 2004; Timbremont & Braet, 2006), we assumed that these programs may not have shown larger effects because the targeted negative cognitive style does not precede depressive symptoms in early adolescence. Hence, the first aim of the study was to test the bidirectional relationships between depressive symptoms and a negative cognitive style. Moreover, because of the strong links of both depressive symptoms and a negative cognitive style with dependent negative life events (Abramson et al., 1989; Auerbach et al., 2010; Beck et al., 1979), we also aimed to test whether the relationship between a negative cognitive style and depressive symptoms remained meaningful when considering dependent negative life events.

Our findings consistently demonstrated that, in a sample of young adolescents with depressive symptoms in the normative range, a negative cognitive style did not predict depressive symptoms. In addition, when we did not consider the role of dependent negative life events in the analyses, the opposite direction was revealed: depressive symptoms predicted a negative cognitive style. Yet, when dependent negative life events were added as a variable next to depressive symptoms and negative cognitive style, the prospective relationship between depressive symptoms and a negative cognitive style did not maintain consistently over time. Furthermore, the prospective association of depressive symptoms on negative cognitive style disappeared when we controlled for the presence of dependent negative life events. These models including dependent negative life events were invariant for gender and intervention condition. Our findings indicate that a) a negative cognitive style does not seem directly predictive of depressive symptoms, and b) a longitudinal relationship between depressive symptoms and a negative cognitive style is hard to interpret when dependent negative life events are not taken into account. As a negative cognitive style did not precede and predict depressive symptoms, we may need to revisit the idea of preventing depression in a community sample of early adolescents by changing a negative cognitive style.

Previous longitudinal research among community samples of adolescents that included three or more measurements of depressive symptoms and a negative cognitive style, but did not include dependent negative life events, showed contradicting findings (LaGrange et al., 2011; Kindt et al., 2015). One study found depressive symptoms to be

predictive of a negative cognitive style (LaGrange et al., 2011), while another found a negative cognitive style to be predictive of depressive symptoms (Kindt et al., 2015). The variations in findings between these studies and the current study might partly be explained by differences in questionnaires used for assessing depression and a negative cognitive style, or participant characteristics such as the age range. As important, both studies (LaGrange et al., 2011; Kindt et al., 2015) differed from the current study because dependent negative life events were not measured and could thus not be added to the analyses. When dependent negative life events would have been controlled for in those studies, as we did in the current study, the predictive relationships between depressive symptoms and a negative cognitive style may also have disappeared.

Previous studies that are most similar to ours also used cross-lagged panel designs, the same questionnaire to measure negative cognitive style, and a questionnaire for dependent negative life events, however, they did not control for the dependent life events (Calvete, 2011; Calvete et al., 2013). With regard to the relationship between depressive symptoms and negative cognitive style, they found reciprocal associations (Calvete et al., 2013) or a more mixed pattern depending on which subscale of the cognitive style questionnaire was analyzed (Calvete, 2011). Why different results were found could be due to stronger associations in the current study between dependent negative life events on the one hand, and depressive symptoms and negative cognitive style on the other hand compared to Calvete and colleagues' studies. Between depressive symptoms and dependent negative life events, the Pearson correlations ranged between .56 and .67 in our study versus between .30 and .40 (Calvete, 2011), and between .29 and .36 (Calvete et al., 2013). Between negative cognitive style and dependent negative life events the Pearson correlations ranged between .38 and .48 in the current study, and ranged between .10 and .27 and between .22 and .28 in Calvete's studies (respectively Calvete, 2011; Calvete et al., 2013). Note that differences can only be concluded with precaution, since the Pearson correlations were based on different sample sizes and different questionnaires for depressive symptoms and dependent negative life events.

The different associations may also reflect different sample characteristics such as cultural differences between Spain (Calvete, 2011; Calvete et al., 2013) and The Netherlands, or between a mainly native sample (Calvete, 2011; Calvete et al., 2013) versus a sample with a high proportion of immigrants, which may be more vulnerable to develop depressive symptoms (Siegel, Aneshensel, Taub, Cantwell, & Driscoll, 1998). Although we included adolescents from schools with a high proportion of pupils living in low-income areas who may be at higher risk to develop depressive symptoms during adolescence, we have labeled our sample as a community sample as it shows normative depressive symptoms that are similar to a Dutch universal sample (Tak, Kleinjan, Lichtwarck-Aschoff, & Engels, 2014).

Nevertheless, because of the higher cross-sectional correlations between depressive symptoms, negative cognitive style and dependent life events in the current study,

controlling for the dependent negative life events had a higher restrictive role on the association between depressive symptoms and a negative cognitive style than it would have had in the studies of Calvete and colleagues (Calvete, 2011; Calvete et al., 2013). As such, the question remains whether controlling for dependent negative life events in those studies would also have led to the same conclusions as presented in the current study, that is, that depressive symptoms and a negative cognitive style are prospectively unrelated when controlled for dependent negative life events.

Implications

If replicated, this study has important implications for the perspective of depression prevention programs in samples of adolescents with normative depressive symptoms. Most depression prevention programs for community samples of young adolescents are based on principles from cognitive behavioral therapy and target a negative cognitive style (e.g., Gillham et al., 2007; Kindt et al., 2014; Pössel et al., 2004; Stice et al., 2009). Even though the impact of those programs is encouraging, it is not considered satisfying (Merry et al., 2012). Based on the present findings, we do not have evidence that a depression prevention program will be able to prevent depressive symptoms by changing a negative cognitive style, because negative cognitive style did not predict depressive symptoms over time. Yet, the merit of the impact of dependent negative life events on the development of both a negative cognitive style and depressive symptoms should be acknowledged. The occurrence of dependent negative life events was associated with depressive symptoms over time, hence, depression prevention programs aiming a reduction of dependent negative life events might be more effective in reducing depression levels than programs aiming a change in a negative cognitive style. As dependent negative life events cover mostly interpersonal events to which the person has contributed (Hammen, 2005), prevention programs could focus on reducing dependent negative life events by social skills training to reduce conflicts with peers or parents. Also, anti-bullying projects, for a better school atmosphere, or programs teaching parents skills how to positively interact with their adolescent might reduce dependent negative life events in youth. Yet, many existing depression prevention programs already involve social problem solving skills (e.g., Gillham et al., 2007; Pössel et al., 2004), and a review showed that the specific content of depression prevention programs (e.g., reducing negative cognitions or focussing on problem-solving) was unrelated to the effect-sizes (Stice, Shaw, Bohon, Marti & Rohde, 2009). Additional research on the depression prevention programs that reduce dependent negative life events could shed light on this field. As the design of the current study does not allow to draw conclusions on the causal interpretation of the relationship between dependent negative life events and depressive symptoms, additional research is first needed to reveal whether dependent negative life events cause an increase of depressive symptoms in young adolescents from a community sample.

Limitations

Several limitations provide opportunities for further research. First, we only used self-report questionnaires. Although self-reports receive criticism because of potential biases, it is a widely used strategy that is well suited for assessing human cognitive and emotional states when it fits in the theoretical context in which it is used (Haeffel & Howard, 2010). Self-reports are a more accurate approach for assessing emotional states and cognitions compared to the use of parents or teachers as source for information (DiBartolo et al., 1998) and specifically for life events, findings suggest that self-reports and interviews may be equally viable methods (Wagner, Abela & Brozina, 2006). Moreover, the use of self-reports enhanced comparison with previous research on depressive symptoms and a negative cognitive style that is also based on self-report measurements. Specifically for measuring parental psychopathology, a multi-informant strategy would have been more reliable and valid than questioning the adolescent whether their parents were ever treated by a psychiatrist. Assessing parental psychopathology the way we did probably excluded parents who had psychopathology but did not receive treatment, and also treated parents whose children did not know they received treatment.

Concerning the dependent negative life events measurements, we formulated three limitations. First, we only measured the frequency of dependent negative life events and did not include the perceived severity or impact of the events, which may have deflated the relationship between dependent negative life events and depressive symptoms (Cohen, Kamarck & Mermelstein, 1983). Second, we found strong cross-sectional correlations between the variables dependent negative life events, depressive symptoms and a negative cognitive style. Adolescents may have reported dependent negative life events in line with their negative cognitive style and depressive symptoms, resulting in an inflated internal consistency of the dependent life events measure and an over-report of these dependent negative life events. More precisely, the dependent negative life events may be over-reported by those suffering from a negative cognitive style, as those individuals may excessively pay attention to negative aspects of a situation and thereby casting the whole situation in a negative context (Beck et al., 1979). In accordance with that, youth with clinical depressive symptoms are found to have an attentional bias toward negative interpersonal stimuli (Gotlib, Krasnoperova, Yue & Joormann, 2004). Also, previous findings in adult samples suggested that a depressed mood (Shrout et al., 1989) and a negative cognitive style (Simons, Angell, Monroe & Thase, 1993) influence over-reporting of negative life events on self-report scales. However, depressive symptoms and a negative cognitive style were not found to be associated with over-reporting of events in community children and adolescents compared to interviews (Wagner et al., 2006). Whether over-reporting has happened could be disentangled by the use of multi-informant strategies in future research, such as questionnaires or interviews with parents, peers or teachers. A third limitation is that we did not assess independent life events, which include major life events such as a divorce by parents, illness or death of family members. Although

dependent life events are most important for depression research (Auerbach et al., 2010; Shih et al., 2006), additionally testing the effect of independent life events would contribute to the knowledge about the impact of negative life events on the development of depressive symptoms and a negative cognitive style.

Furthermore, although a large proportion of the immigrant adolescents had an ethnic background that is a minority group in the Netherlands (e.g., Moroccan, Turkish), this was not the case for a substantial proportion of the sample. As such, conclusions drawn about the immigrant adolescents cannot be generalized to minority groups in general. At last, the results of this study cannot be generalized to adolescents with clinical levels of depression. As meta-analyses have shown that indicated prevention efforts are more effective than universal prevention programs, even when the same program is used for a different target group (Merry et al., 2012; Stice et al., 2009), it may be that prospective relationships between a negative cognitive style and depressive symptoms are different among adolescents with elevated depressive symptoms.

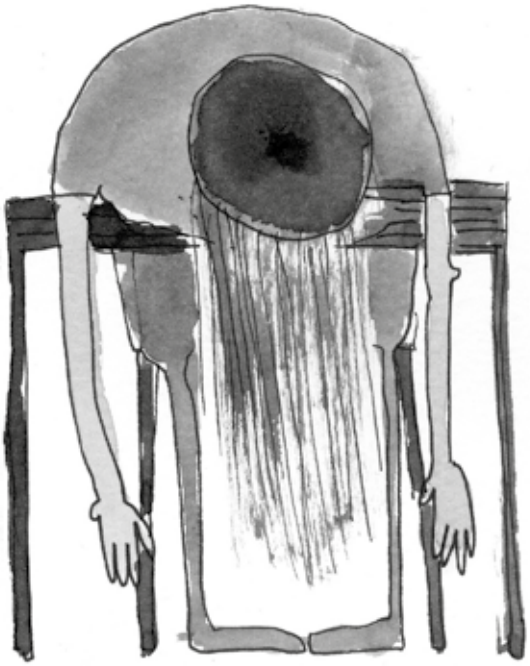
Future research is encouraged to replicate the current study by following samples of youth over an extended period of time. As it was beyond the scope of the current study, further research could test existing theories such as the stress generation theory (Hammen, 1991; Daley et al., 1997), postulating that negative life events are increased by depression, or scar theory (Lewinsohn, Steinmetz, Larson & Franklin, 1981), postulating that a negative cognitive style is left after a depressive episode.

Conclusions

Based on cognitive theories that suggest that a negative cognitive style precedes depression, cognitive-theory based depression prevention programs aim to prevent adolescents from developing depressive symptoms by changing a negative cognitive style. As these programs have shown to have only small effects in universal settings, we examined the longitudinal relationships between depressive symptoms and a negative cognitive style, with additionally considering the role of dependent negative life events. Our findings demonstrated that a negative cognitive style did not predict depressive symptoms in young adolescents with depressive symptoms in the normative range. Moreover, this study showed that, when not including dependent negative life events, findings on the relationship between depressive symptoms and a negative cognitive style may show a misleading pattern. Further research should examine whether the findings are replicated. We cautiously conclude that we may need to revise the idea to focus on changing a negative cognitive style in universal depression prevention programs and suggest that more attention could be given to dependent negative events in the lives of adolescents.

7

GENERAL DISCUSSION



General discussion

The first aim of the current thesis was to test the effectiveness of the group-based depression prevention program 'Op Volle Kracht' (OVK) among early adolescents (Part I). The findings extend the existing knowledge on worldwide depression prevention efforts by providing insight into effectiveness of a depression prevention program in the Dutch context. Although changing a negative cognitive style underlies depression prevention programs based on cognitive behavioral theory, whether a negative cognitive style indeed is predictive of depressive symptoms in early adolescence is understudied. As such, the second aim of the thesis was to increase the knowledge of the reciprocal influences of depressive symptoms and a negative cognitive style over time (Part II).

In this General Discussion, the main findings are summarized and discussed in light of existing knowledge. In addition, we discuss opportunities for improving depression prevention and suggest directions for future research.

Summary

Part I

The thesis began with a general introduction, followed by the study protocol regarding the effectiveness trial of the depression prevention program Op Volle Kracht (OVK), which described the design, hypotheses, procedure, outcome measurements and analysis method (Chapter 2). We used a Randomized Controlled Trial (RCT) among 1,343 adolescents from the first and second grade of 11 Dutch secondary schools (age 11–16 years). The control condition received the regular school curriculum while the intervention condition received cognitive behavioral theory-based depression prevention program (OVK) comprising 16-lessons. As the selected schools had at least 30% of their pupils living in low-income areas in the Netherlands, the included adolescents were expected to be at an increased risk of developing depressive symptoms, as depressive symptoms appear to be more prevalent among individuals living in low-income areas (De Looze et al., 2014; Smit et al., 2013). Participants completed self-report measurements of depressive symptoms (primary outcome), clinical depressive symptoms, negative cognitive style, and negative life events (secondary outcomes) online at baseline, post-intervention, and at 6 and 12 months follow-up. Because both pragmatic and cost arguments are important for a feasible implementation in the future, a school setting was chosen in which trained teachers administered the program in a classroom setting. We expected that adolescents receiving the intervention would develop significantly fewer depressive symptoms at one-year follow-up compared to the control group.

The main findings, both after analyzing completers only (CO) and following the intention to treat (ITT) principle, showed that the program was not effective in preventing adolescents from developing depressive symptoms (Chapter 3). Gender, age, ethnic

background, and parental psychopathology did not moderate these effects. In addition, the average level of depressive symptoms in the sample was in the normative range at all time points and did not change over the study period. We concluded that adolescents from low-income areas were not particularly at risk of developing depressive symptoms during the first two years of secondary school and that OVK did not affect the development of depressive symptoms. Contrary to what we hypothesized, adolescents who received OVK more often developed clinically depressive symptoms at 12-months follow-up compared to adolescents who received the regular school curriculum. Sensitivity analyses, however, indicated that this iatrogenic effect might have been influenced by the way in which the missing data were handled. On the other hand, OVK appeared to protect specifically the subgroup of adolescents with parents with psychopathology from developing clinical depressive symptoms.

The study also aimed to examine whether teaching adolescents how to change a negative cognitive style into a more realistic, helpful cognitive style, which is a central skill taught in OVK, plays a mediating role in depression prevention. As we did not find any effect of OVK program on depressive symptoms, it did not make sense to conduct mediation analyses. Still, we analyzed the effectiveness of the program in changing the adolescents' negative cognitive style, and the results revealed that the program was in fact ineffective (Chapter 4). We observed four different patterns of a cognitive style over three measurements following the intervention. The majority of the sample followed a *normative* trajectory (i.e., stable low depressive symptoms over the measurements) while a minority of the sample showed a *stable high* trajectory. Two trajectories showed a changing pattern: 18.3% of the sample showed an *increasing* trajectory while 10.7% showed a *decreasing* trajectory. Moreover, contrary to our hypothesis, attending OVK or being in the control group was not predictive of a certain trajectory. We concluded that OVK was not effective in changing a negative cognitive style and that the program was also not able to prevent adolescents from developing depressive symptoms.

Part II

In the second part, we took a developmental perspective and tested the reciprocity between depressive symptoms and a negative cognitive style over time independently of the OVK intervention. As cognitive behavioral theory-based interventions are based on the premise that a negative cognitive style precedes the development of depressive symptoms, it is of importance to gather knowledge on the prospective relationships between a negative cognitive style and depressive symptoms. We analyzed datasets from two longitudinal studies on depression prevention in early adolescents. In addition, because negative life events are cross-sectionally related to depressive symptoms and a negative cognitive style (Gladstone & Kaslow, 1995; Joiner & Wagner, 1995), we tested whether negative life events affected the prospective relationships between depressive symptoms and a negative cognitive style.

In the first study, we analyzed the data collected over three time points (baseline, 6 and 12 months follow-up) from a community sample of 720 young adolescents (47.2% girls, Mean age = 13.4, *SD* = 0.62) who were mainly of Dutch descent and were in a control group of a depression prevention study (Chapter 5). The reciprocal relationships between depressive symptoms and a negative cognitive style were analyzed using a cross-lagged panel design. As girls are known to show a stronger increase in depressive symptoms during adolescence compared to boys, we also examined the moderating effect of gender. In this study, we found that a negative cognitive style predicted higher levels of depressive symptoms, but not vice versa. These patterns were found consistently over the three measurements and were the same for boys and girls. The findings suggest that a preexisting negative cognitive style influences the development of depressive symptoms while a negative cognitive style develops independently of previous levels of depressive symptoms.

However, compared to the results from the community sample, we found contradicting results in our study on the effectiveness of OVK (Chapter 6). Four assessments, conducted every 6 months over a period of 18 months, measuring depressive symptoms and a negative cognitive style of 1,343 adolescents were included in a cross-lagged panel analysis. We analyzed three models: 1) a basic model in which we disregarded negative life events and only used the four measurements of depressive symptoms and a negative cognitive style in a cross-lagged panel design, 2) a second model in which negative life events were added to the basic model along with depressive symptoms and a negative cognitive style, and 3) a third model in which negative life events were controlled for by adding them as a time-varying covariate to the basic model. Across all three models, we consistently found that a negative cognitive style did not predict depressive symptoms and that being in the OVK or control group did not moderate these cross-lagged relationships. In the model that did not include negative life events (basic model), depressive symptoms consistently predicted a negative cognitive style but not vice versa. In this basic model, we found a moderating effect of gender, showing that depressive symptoms at T3 predicted an increased negative cognitive style at T4 but only for girls. When we added negative life events as a variable in addition to depressive symptoms and a negative cognitive style in the cross-lagged panel design (second model), association between depressive symptoms and a negative cognitive style emerged only between T1 and T2. Moreover, when controlling for negative life events by including them as a time-variant covariate at all time-points (third model), the prospective association of depressive symptoms with a negative cognitive style disappeared altogether. In contrast to the first study in Part II, we concluded that a negative cognitive style did not predict depressive symptoms and that a longitudinal relationship between depressive symptoms and a negative cognitive style was difficult to interpret without considering negative life events. As such, we postulated that we might need to revisit the idea of depression prevention in early adolescents with moderate depressive symptoms by changing a negative cognitive style.

It is difficult to compare the two studies, as we used two different samples (i.e., a community sample and a selective sample) and different questionnaires to measure a negative cognitive style. Concerning the different samples, both showed moderate depressive symptoms; thus, they may be more similar than they appeared at first glance. Regarding the questionnaires, in the second study, we used a well-studied and validated questionnaire (Hankin & Abramson, 2002) while the questionnaire used in the first longitudinal study has been used less frequently and has not been validated yet.

Table 1 Summary of the main findings

Finding	Chapter
The OVK depression prevention program had no effect on depressive symptoms in early adolescents.	3
No differences in effectiveness were found across subgroups in terms of age, gender, parental psychopathology, and ethnic background.	3
OVK had an iatrogenic effect on clinical depressive symptoms at one-year follow-up.	3
OVK was effective in preventing clinical depressive symptoms in adolescents with parents with psychopathology.	3
A negative cognitive style showed four different patterns in early adolescents: normative, stable high, increasing, and decreasing.	4
OVK did not affect a negative cognitive style or the development of a negative cognitive style.	4
In a community sample, a more negative cognitive style predicted an increase in depressive symptoms six months later.	5
When not considering the effect of negative life events, depressive symptoms predicted a negative cognitive style six months later in a selective sample.	6
The relationship between depressive symptoms and a negative cognitive style decreased when dependent negative life events were included in the model and disappeared when controlling for dependent negative life events.	6
The relationship between depressive symptoms and a negative cognitive style was not different for boys and girls.	5 and 6

Reflections on the main findings

The following sections discuss the findings on the effectiveness of the OVK intervention in Part I. Subsequently, the discussion on the effectiveness is related to the findings in Part II on the reciprocal development of depressive symptoms and a negative cognitive style and on the effect of dependent negative life events on this development. Next, implications for depression prevention efforts and opportunities for future research are described.

Effectiveness OVK

Although a meta-analytic Cochrane review concludes that depression prevention programs may be effective (Merry et al., 2012), OVK did not attenuate (the increase of) depressive symptoms in early adolescents in the Netherlands. Our findings are inconsistent with research findings of the PRP-program on which OVK was based, which revealed a small but significant effect sizes, ranging from 0.11 to 0.21 across studies (Brunwasser et al., 2009). The absence of a significant effect in the current study indicates that the school-based OVK depression prevention program may not prevent Dutch adolescents from developing depressive symptoms (see also Tak, Kleinjan, Lichtwarck-Aschoff, & Engels, 2014). Yet, since other depression prevention programs have showed heterogeneous effects across studies (Brunwasser et al., 2009; Merry et al., 2012; Stice et al., 2009), several explanations are discussed for not finding an effect of OVK in the current study.

Targeted population

We know from previous research that depression prevention programs have stronger effect sizes in selective and indicated populations than in universal populations (Merry et al., 2012; Muñoz, Cuijpers, Smit, Barrera, & Leykin, 2010; Stice et al., 2009). Therefore, we chose to implement OVK in schools with a high proportion of adolescents from low-income areas, as they may be especially at risk of developing depressive symptoms (Barreto & McManus, 1997; De Looze et al., 2014; Smit et al., 2013). Nonetheless, seeing that the Netherlands is a generally prosperous country in which even low-income populations have a government-guaranteed basic income, and children in the Netherlands are ranked as the highest on well-being out of 29 of the world's most advanced economies, according to UNICEF (Adamson, 2013), one could argue whether our sample actually constituted an at risk sample. Indeed, our sample appeared to exhibit depressive symptoms at baseline, similar to that of normative samples (Tak et al., 2014). Moreover, depressive symptoms barely increased during the course of the study. Hence, a floor effect might explain the lack of the effect of the program in that a reduction of depressive symptoms could not be observed due to low depressive symptoms at baseline and the fact that an increase in depressive symptoms in the control group did not occur. Yet, the OVK intervention may be specifically effective for adolescents with parents with psychopathology, as these adolescents showed a relatively lower chance of developing depressive symptoms in the clinical range compared to adolescents whose parents also had psychopathology but who did not receive OVK. Although we need to acknowledge that these findings should be interpreted with caution, as they were based on a small sub-sample, this finding is in line with previous research (Stice et al., 2009) and provides an important avenue for determining, which subgroups could be targeted to enhance the effectiveness of selective depression prevention efforts.

Another explanation for lack of program effect is related to the young age of the adolescents. Meta-analytic reviews have found support that depression prevention programs produce larger effects in older adolescents (Horowitz & Garber, 2006; Stice et al., 2009). Depression prevention trials with participants above the age of 13.5 years exhibited moderate effect sizes, whereas trials on younger participants showed negligible effect sizes (Stice et al., 2009). An explanation may be that early adolescents have more difficulties to grasp the abstract concepts and skills that are taught in cognitive behavioral theory-based interventions. Moreover, as depressive symptoms tend to increase after the age of 15 years (Garber, Keiley, & Martin, 2002; Hankin et al., 1998), an effect is more likely to be found from that age on. Unfortunately, due to our rather homogeneous sample of young adolescents (94% being 13 or 14 years old at the start of the intervention), we were not able to test whether the program was more effective for older adolescents or whether age moderated the intervention effect.

A final aspect is that the OVK program may have been less effective because about 50% of our sample comprised adolescents from ethnic minority groups[1], such as Turkish or Moroccan. A meta-analysis suggests a stronger effect size for samples with a higher proportion of ethnic minorities (Stice et al., 2009), probably because these samples were at a greater risk of developing depressive symptoms and thus had more room for improvement (Siegel, Aneshensel, Taub, Cantwell, & Driscoll, 1998). Yet, other arguments exist why a weaker effect size could be found in a sample with a high proportion of minorities. A large survey study in the Netherlands revealed that adolescents with a Dutch and with a minority background reported similar levels of emotional problems (De Looze et al., 2014), indicating that both subgroups are at an equal risk in this respect. Yet, the description of depressive symptoms in the DSM-IV might not fit all cultures equally well. For instance, migrants are found to express mood disorders differently and to show more somatization (Borra, 2003; Kirmayer & Young, 1998). Measuring depressive symptoms using a DSM-IV based questionnaire may thus not adequately capture the level of depressive symptoms in ethnic minorities. In addition, in the Dutch specialized mental health care setting, the rates of drop-out of treatment among clients with Turkish and Moroccan backgrounds are higher, which is explained by the different frame of reference they may have with regard to the experience, presentation, and interpretation of causes of psychological complaints, such as depressive symptoms (Hilderink, Van het Land, & Smits, 2009; Van Daal, Sönmez, & Brugman, 2003). This may also implicate that adolescents from ethnic minorities in our study may have had other expectations on how to deal with depressive symptoms. Although we did not find moderating effects for the adolescents classified as minority group, we did not specify our analyses for specific subgroups that may have other frames of references about prevention or treatment of depressive symptoms, such as Turkish and Moroccan minority groups. As such, the skills taught in the

1 The term 'immigrants' is used in chapter 6.

OVK may not be experienced as useful for at least some of the adolescents with a minority background. This may have suppressed the effect of OVK, since half of our sample consisted of minorities.

Implementation issues

The implementation of OVK in the school setting might have contributed to the ineffectiveness of the program. First, trained school mentors delivered the OVK program instead of the therapists who are familiar with cognitive behavioral therapy. Although mentors are familiar with didactics, the adolescents and the regular school procedures, and they are able to incorporate the techniques that are taught in OVK also at other moments during the year (Lima-Serrano & Lima-Rodríguez, 2014; Silverstone et al., 2015), as program facilitators, they are at a disadvantage. For instance, they may not have been sufficiently competent or trained to transfer all the programs' content and the cognitive behavioral techniques to the adolescents. Unfortunately, we do not have the data to analyze whether either program fidelity or treatment integrity or both have reduced the effect of the program. Previous research on the PRP program has shown that the program produced the strongest results when led by the members of the research team who had developed the program (Gillham et al., 1995; Gillham, Hamilton, Freres, Patton, & Gallop, 1996) while the effects were smaller when provided by schoolteachers (Yu & Seligman, 2002). Two out of three studies that attempted to replicate PRP's effects in Australia failed to show significant results, despite the fact that the school teachers received extensive training (Pattison & Lynd-Stevenson, 2001; Quayle, Dziurawiec, Roberts, Kane, & Ebsworthy, 2001; Roberts, Kane, Thomson, Bishop, & Hart, 2003). Moreover, given that we received mixed responses from the mentors about whether they liked the program or not, the effectiveness of the program may have differed per mentor. Yet, although each mentor taught OVK one single class only, we did not find indications of multilevel effects and we have used multilevel analyses to control for cluster effects for classes. Thus, differences between teachers are not likely to explain non-effectiveness of the program.

Another implementation-related reason for not finding an overall effect of OVK on depressive symptoms concerns the whole-class approach we took. As the PRP manual recommends a group size between 10 and 12, the groups used in our study, ranging from 12 to 27, may have been too large for the adolescents to mentally incorporate and train the provided skills, and thus to generalize the skills taught to their personal situations. However, comparable cognitive behavioral based depression prevention programs found the effects when administered in a whole-class setting (Pössel, Baldus, Horn, Groen, & Hautzinger, 2005). Moreover, a whole-class approach also means that the program is provided to a mixed group comprising adolescents with depressive symptoms and those not having depressive symptoms. As adolescents who experience symptoms of depression are known to perceive lower levels of acceptance and support from their peers (Stice & Ragan, 2004), this perception may increase during their participation in the

depression prevention program in which the adolescents were invited to share their experiences and thoughts about difficult situations. For example, adolescents scoring high on depressive symptoms may not recognize the emotions, interpretations, and cognitions pertaining to situations described by others, and by consequence, they may become more aware of being different (Dolphin & Hennessy, 2014). A third reason why the whole class approach may have reduced the effect size may be that boys and girls received the program together. Girls-only groups have shown stronger effects compared to mixed groups (Chaplin et al., 2006) possibly because adolescent girls may be more likely to share and discuss their emotions and thoughts in female-only groups. Depression prevention programs may thus be more effective when delivered to gender homogenous groups.

Characteristics of the program

Furthermore, characteristics of the OVK program itself may have decreased the effectiveness for Dutch adolescents. First, the OVK program adopts a rather traditional approach that uses a paper workbook and instructions of a mentor standing in front of the class. This approach may not have evoked adolescents' interests, as they are nowadays increasingly more used to multi-media approaches. The didactic approach of OVK might also remind them of how other courses are taught at school. Especially because the intervention group received OVK as an extra course, unlike the control group, this may have led to increased resistance and decreased involvement during the program. Participants differed in their motivation to participate in the program specifically, 23% was not motivated at all, 42% was a little motivated, 23% was pretty much motivated, 6% was very much motivated, and 6% did not know. Qualitative feedback from the teachers and adolescents about the program was mixed, with a substantial part reporting that the program was perceived as boring. Although entertainment should not be the goal of a depression prevention program, an interesting and appealing program facilitates engagement and motivation and consequently, the skills taught are consolidated and remembered more easily (Pintrich, 2003; Pintrich, Marx, & Boyle, 1993). In line with this, post hoc analyses showed that within the group of adolescents who received the OVK program, adolescents who reported being motivated during the training showed stronger improvements in scores on depressive symptoms compared to their peers who reported not being motivated (Chapter 3). To increase engagement and interest of adolescents in a program with educational goals, the opportunities to incorporate video games are gaining increasing attention in research (Garris, Ahlers, & Driskell, 2002). A recent article revealed positive effects of video games on cognitive, emotional, motivational and social domains (Granic, Lobel, & Engels, 2014) and as such, the development of depression prevention games may provide promising opportunities for the future.

A final aspect that may have decreased the effectiveness of the program is its duration. Based on a qualitative feedback, it appears that the program was perceived as

comprising too many lessons. A previous meta-analysis on depression prevention programs showed that programs that lasted longer (more than 12 hours) exhibited a smaller average effect size compared to shorter programs (Stice et al., 2009). This seems in line with the reports that the duration of the OVK program, which comprised 16 lessons of 50 minutes, was too long.

Design

A final reason for not finding the effects of OVK could be related to the design; specifically, the chosen measurement strategy. First, whether the CDI is sufficiently sensitive to changes in depressive symptoms over time is debatable. A meta-analytic review of more than 61,000 children and adolescents showed a testing effect of the CDI that cannot be neglected. Studies that used CDI measurements in cross-sectional designs showed an increase in depressive symptoms from childhood to adolescence, whereas longitudinal studies showed progressively lower scores over the years with successive administrations of CDI measurements (Twenge & Nolen-Hoeksema, 2002). Even two self-report measurements were already enough to create this decreasing effect (Slavin & Rainer, 1990). Although this testing effect may reduce the reliability of the CDI for interpreting the outcomes of depression prevention research, it does not explain the lack of difference between the control and intervention groups in our study, especially because other studies that also used repeated measures with the CDI reported significant intervention effects (Brunwasser et al., 2009; Stice et al., 2009).

With respect to the measurements, whether the interval of six months is too long is also debatable. For instance, we may have missed more subtle changes in depressive symptoms that take place over weeks and days instead of months. Daily fluctuations in depressive symptoms have been found in young adults (Hankin, Fraley, & Abela, 2005) and adolescents (Silk, Steinberg, & Morris, 2003). To establish higher precision in fluctuations in intervention effects over time, Ecological Momentary Assesments (EMA) could be used. EMA are characterized by repeated measurements assessing people's current or recent states or behaviors in real-life settings. One of the advantages of EMA is that it can result in more ecologically valid measures, as data are collected in the natural environment, and reduce biases related to retrospective recall. Internalizing problems have previously been measured with several daily assessments (e.g., Van Roekel et al., 2013). Yet, daily or weekly measurements have not been used to evaluate depression prevention programs. Weekly evaluations have provided additional insights compared to limited follow-up measurements in a study that evaluated the effectiveness of an alcohol prevention program (Voogt, Kuntsche, Kleinjan, Poelen, & Engels, 2014). Latent growth curve analysis provided the opportunity to assess changes in alcohol use and intervention effectiveness while taken into account the fluctuating nature of alcohol use among students. Results showed a stronger effect on alcohol use in the intervention condition compared to the control condition that was not seen by only analyzing the follow-up measurements over months

(Voogt, Poelen, Kleinjan, Lemmers, & Engels, 2013). As such, weekly or daily measurements may also provide additional insight into how depression prevention programs work.

Another measurement related aspect that could have contributed to the insignificant findings could be that the program may have had effects on other important factors in addition to depressive symptoms that have not been measured. With respect to the latter, it needs to be mentioned that some schools reacted to the OVK-program enthusiastically and that they reported a more positive school atmosphere in general. This qualitative feedback, although not systematically collected or measured, encourages us to think more broadly about possible outcome variables that could be administrated in future research, such as school atmosphere and positive peer interactions. Previous literature has also shown that a positive school climate is related to psychological well-being (Kuperminc, Leadbeater, & Blatt, 2001; Way, Reddy, & Rhodes, 2007).

Underlying mechanisms

Although many depression prevention programs have been developed with cognitive behavioral principles as the underlying mechanisms (e.g., Garber, 2006; Gillham, Hamilton, Freres, Patton, & Gallop, 2006; Lewinsohn, Clarke, Hops, & Andrews, 1990; Pössel et al., 2005), one question that needs to be answered is whether a CBT theoretical framework, especially the technique of restructuring a negative cognitive style, indeed provides a useful basis for depression prevention programs targeting early adolescents. In two studies, we found prospective relationships between a negative cognitive style and depressive symptoms over time, yet in the opposite directions. More importantly, these prospective relationships disappeared when we controlled for dependent negative life events. Consequently, we concluded that we did not find indications that a negative cognitive style preceded or followed the development of depressive symptoms in early adolescents with low depressive symptoms. It is thus not likely that a CBT-based program, such as OVK, provides the most optimal prevention for depressive symptoms among adolescents through changing their negative cognitive style. Yet, as a negative cognitive style has been found to be predictive of depressive symptoms in adolescents with a high level of negative cognitions (Carter & Garber, 2011), changes in negative cognitive style could precede a change in depressive symptoms in specific high-risk groups. This may, to a certain extent, explain why CBT-based depression interventions that target a negative cognitive style show stronger effects in indicated (Stice et al., 2009; Wijnhoven et al., 2014) and treatment settings (Weisz, McCarty, & Valeri, 2006) than in a universal setting. The whole-class approach we took may explain why we did not find that the subgroup with clinical depressive symptoms at baseline profited from the OVK intervention. As discussed in the previous section, this approach may have led to stigmatization or decreased perceived peer acceptance, which in turn may have reduced the positive intervention effects.

In line with our findings, it is also difficult to draw conclusions from the existing literature about the potential effectiveness of targeting a negative cognitive style to prevent the development of depression. It is not clear from previous empirical studies whether an increased negative cognitive style predicts depressive symptoms. For instance, some studies that concluded that a negative cognitive style predicted depressive symptoms conducted analyses to confirm this particular direction without testing the opposite direction (e.g., Abela & Hankin, 2011) and included middle to late adolescents but not early adolescents (e.g., Abela et al., 2011). Specifically, early adolescents may still be developing a cognitive style (Cole et al., 2008), and the relationship between depressive symptoms and a negative cognitive style therefore requires further research. Other research that tested both directions found more support suggesting that depressive symptoms predict a negative cognitive style rather than vice versa (Johnsen & Miller, 1990; Hankin, Abramson, & Siler, 2001; LaGrange et al., 2011; McCarty, Stoep, & McCauley, 2007; Stewart et al., 2004). These studies used mostly longitudinal models with only two administrations and did not additionally control for confounding variables (e.g., Calvete, 2011; Calvete, Orue, & Hankin, 2013; Gibb & Alloy, 2006; Hankin et al., 2001; McCarty et al., 2007; Stewart et al., 2004). Generally, insufficient evidence suggests changes in depressed youth over the course of psychotherapy are mediated by changes in the cognitive style (Kolko, Brent, Baugher, Bridge, & Birmaher, 2000; Spielmans, Pasek, & McFall, 2007; Weersing & Weisz, 2002). Perhaps the most serious challenge to the existing research is that all studies reviewed so far suffer from the fact that they either did not include dependent negative life events or that they only examined whether these events played a moderating role without controlling for its effects, like we did.

The institutes that advice on mental health care in youth, such as the Netherlands Youth Institute (NJI), should be concerned with the lack of empirical evidence from these longitudinal studies, which would suggest that a negative cognitive style precedes and predicts an increase in depressive symptoms. The NJI assesses the effectiveness of prevention programs that are being used with Dutch youth (health) care at four levels of quality. Based on these accreditations, policy makers at schools and youth (health) care institutions decide which programs they will implement. Yet, while the Netherlands Youth Institute accredits programs that are based on CBT with the label 'theoretically well elaborated' (i.e., the first and lowest level of accreditation), we may need to reconsider whether this accreditation provides us with useful information about depression prevention programs for early adolescents.

Other factors rather than a negative cognitive style could contribute to the effects of depression prevention programs. For example, dependent negative life events (which are mostly interpersonal) rather than independent negative life events (which are mostly non-interpersonal) may play a more important role than previously thought. In our study, dependent negative life events were strongly associated with both depressive symptoms and a negative cognitive style, and the prospective relationships between depressive

symptoms and a negative cognitive style disappeared when controlling for the dependent negative life events. Additionally, in clinically referred adolescents, depression is particularly associated with interpersonal stress (Rudolph et al., 2000). Other studies have shown that independent negative life events (e.g., poverty) affect dependent negative life events (e.g. negative parent-child interactions), which in turn affect the development of depressive symptoms (Grant et al., 2003; Grant et al., 2006). In these studies, the independent negative life events thus appeared to play a mediating role. In accordance, the interpersonal theory states that dependent negative life events or disruptions of important interpersonal relationships and interactions influence the depressive symptoms of adolescents (Joiner & Coyne, 1999; Rudolph et al., 2000). We found dependent negative life events to predict depressive symptoms, although this predictive association was not stable over time (Chapter 6). One explanation for not finding a stable relationship might be found in the hopelessness theory, which states that it is mainly the interaction between dependent negative life events and a negative cognitive style that causes the increase in depressive symptoms (Abramson, Metalsky, & Alloy, 1989). The adolescents in our sample may not have had dependent negative life events to such an extent that it caused an increase in depressive symptoms at all time points, partly because we did not include the interaction of negative life events with a negative cognitive style in the analyses. The question whether dependent negative life events are predictive of depressive symptoms, and under which specific circumstances such a relation occurs needs further research. The same goes for the question whether future depression prevention programs should focus on decreasing dependent negative life events as a strategy to reduce depressive symptoms.

Overall, as our study found that a negative cognitive style did not predict depressive symptoms in early adolescents, another underlying mechanism might have to be targeted by a prevention program to attenuate the development of depressive symptoms. Future research should focus on different possible mechanisms and on decreasing dependent negative life events.

Depression prevention in the future

Regarding our findings that OVK was not effective in preventing early adolescents from developing depressive symptoms, we advise not to implement OVK in its current form in schools in the Netherlands. It is important to consider not only the lack of an effect, but also the potentially negative consequences of CBT skills on adolescents who are in the stage of their lives in which they are not particularly moldable or interested in changing their cognitive style. When they are offered the technique of cognitive restructuring later in life, for instance, when they receive CBT-therapy for a depressive disorder, they may remember or recognize the technique as uninteresting or not useful and may not be motivated to utilize it. As a result, a higher dropout during therapy may occur. The dropout

rate in CBT-therapy has shown to be substantial in adults, with more than 25% of the clients showing retention during therapy (Bados, Balaguer, & Saldaña, 2007; Van Ingen, Freiheit, & Vye, 2009). The most common reported reason for dropout is a low motivation (Bados et al., 2007; Cinkaya, Schindler, & Hiller, 2011). Hence, the effect of a prevention program on the motivation of an adolescent to follow and finish a therapy seems to be of great importance. Yet, in therapy, the techniques are discussed individually and more in depth compared to the OVK lessons offered at school, which will probably appeal more to the adolescents needs. Additionally, adolescents who start the therapy will probably have a more negative cognitive style (Carter & Garber, 2011) and will therefore be able to adapt the offered techniques better to their personal situation. Although we have no data to underwrite the notion that a CBT-based depression prevention program may reduce the effect of CBT later in life, it should be kept in mind as a possible unwanted side effect.

Yet, we are not suggesting that all efforts to develop effective prevention program for depression should stop. Although whether a universal approach of depression prevention has sufficient effect to be clinically meaningful has been discussed in the existing literature (Merry, 2007; Spence & Shortt, 2007), the most recent meta-analysis of depression prevention programs concluded that universal programs have beneficial effects (Merry et al., 2012). Merry et al.'s study showed that universal programs reduced depressive diagnoses at post-intervention (Risk Difference (RD) -0.12) and that the effect remained at three- and nine-months follow-up (RD -0.19). First, we need to bear in mind that it was also difficult to develop successful prevention programs for adolescents for other behavior problems, such as for alcohol (Spijkerman et al., 2010; Voogt, Poelen, Kleinjan, Lemmers, & Engels, 2013), tobacco (Hiemstra et al., 2014; Wiehe, Garrison, Christakis, Ebel, & Rivara, 2005), both alcohol and tobacco (Malmberg et al., 2014), bullying (Smith, Schneider, Smith, & Ananiadou, 2004; Ttofi & Farrington, 2011), obesity (Stice, Shaw, & Marti, 2006), or anxiety (Barrett, Farrell, Ollendick, & Dadds, 2006). Moreover, despite the fact that we currently do not have effective universal depression prevention programs to implement in the Netherlands (see also Figure 1 of the introduction), our study and previous studies provide information on the ways in which the content and delivery of depression prevention programs in the future could be altered.

Opportunities for indicated selection

CBT-based depression prevention programs may be specifically useful for several indicated subgroups. First, samples with elevated depressive symptoms seem to profit from OVK, as previous research showed a medium to large effect size in girls with elevated depressive symptoms at six months following the program (Cohen's $d = -0.74$; Wijnhoven et al., 2014). Additionally, selecting adolescents with parental psychopathology may be a good strategy because these adolescents show higher rates of psychopathology, such as depressive symptoms (Beardslee, Versage, & Gladstone et al. 1998; Dean et al., 2010; Hosman, Van Doesum, & Van Santvoort, 2009). Preventive support groups for children of

mentally ill or addicted parents have shown positive effects on depressive symptoms (Beardslee et al., 2013; Van Santvoort, Hosman, Van Doesum, & Janssens, 2014); moreover, OVK has shown to be most successful for this subgroup (Chapter 3). The OVK program may, after being adapted, also be useful for older adolescents who are known to have higher depressive symptoms (Costello, Erkanli, & Angold, 2006; Hankin et al., 1998). Implementing CBT-based interventions in indicated groups would be in line with a meta-analysis that showed larger effect sizes for targeted CBT-based depression prevention programs (Merry et al., 2012; Stice et al., 2009). Specific attention needs to be paid to adolescents with suicidal ideation, as this is related to depressive symptoms (Capron, Allan, Ialongo, Leen-Feldner, & Schmidt 2015). Suicide is the most serious consequence of depressive symptoms; hence, screening specifically for suicidal ideation next to elevated depressive symptoms could identify the most vulnerable subgroups, as 4% of the European youth are estimated to attempt suicide (Carli et al., 2014).

Changing program components

Another opportunity for improvement of depression prevention is to change the components of a depression prevention program. The main components of OVK are cognitive-behavioral, social, and problem solving skills. Although these skills are commonly used in depression prevention programs, as well as in trials that have shown to be effective (Brunwasser et al., 2009; Stice et al., 2009), programs with additional components may result in larger effect sizes (Garber, 2006). Behavioral activation (BA) may be an additional component that could increase the effect size. BA is described as increasing engagement in activities that are associated with mastery or pleasure and solving problems that limit access to reward (Dimidjian, Barrera, Martell, Muñoz, & Lewinsohn, 2011). BA has been repeatedly found to be an effective component of the treatment of depressive disorders (Dimidjian et al., 2006; Gortner, Gollan, Dobson, & Jacobson, 1998; Jacobson et al., 1996; Jacobson & Gortner, 2000), and it is the first step in the Dutch practice guidelines for mental health care for adults (GGZ-richtlijnen; Spijker et al., 2013). Surprisingly, BA is not yet included in the practice guidelines for depression treatment in youth because research is needed for both treatment of depressive disorders (Weisz, McCarty, & Valeri, 2006) and prevention efforts among adolescents (Stice et al., 2009). A second additional component may be psycho-education about depression so that adolescents learn to recognize depressive symptoms in themselves or their peers, which can also diminish feelings of being 'different' and stigmatization. Starting a program with psycho-education may increase knowledge and may lead to increased interest in the cognitive behavioral, social, and problem solving skills that are taught. Psycho-education may also reduce the feelings of guilt and shame when recognizing depressive symptoms or own ineffective cognitive strategies that are targeted during the program.

Opportunities for reducing dependent negative life events

Furthermore, successful depression prevention programs are able to decrease dependent negative life events, such as conflicts with peers, parents, or teachers. For instance, a depression prevention program that includes social skill training components needs to improve adolescents' social skills, which would decrease conflicts among peers (Garber, 2006). Furthermore, a program could improve the class atmosphere through group discussions and problem sharing. Additionally, programs that involve parents could reduce negative parent-child conflicts and coach them on their parent-child interactions. These improvements in social skills, class atmosphere, and parent-child conflicts could reduce dependent negative life events, which may subsequently reduce depressive symptoms. A reduction in conflicts among peers (i.e., peer related dependent negative life events) may be the reason why the group-based 'Kanjertraining' was found to reduce internalizing problems in pre-adolescents, as this program promoted pro-social behavior (Vliek, Overbeek, & Orobio de Castro, 2014). The reduced conflict in the family may be the reason why the 'Family Talk' intervention reduced internalizing problems in 8-16 year olds in families with a depressed parent, as this program promoted pro-social behavior and constructive parent-child communication (Beardslee et al., 2013; Solantaus, Paavonen, Toikka, & Punamäki, 2010). These kinds of interventions may also support parent-child closeness, which has been found to have prospective beneficial buffering effects on the effect of negative life events on depressive symptoms in adolescents (Ge, Natsuaki, Neiderhiser, & Reiss, 2009).

Including other parties

Partly in line with the previous paragraph, a beneficial effect of depression prevention programs may be increased by including also other parties in the intervention besides the adolescent him or herself, such as parents and teachers. Such a multi-component approach involving different parties has been found to evoke a larger effect in prevention programs for externalizing behavior, such as substance use (Jackson, Geddes, Haw, & Frank, 2012; Koning, Van den Eijnden, Engels, Verdurmen, & Vollebergh, 2011; Koning et al., 2009; Sowden & Stead, 2003). So far, the number of depression prevention trials with a multi-component approach is limited. A pilot study showed that PRP with a parent component in which the parents were taught the same skills as their children (i.e., challenge their pessimistic cognitions and to think more accurately and optimistically about adversity) was effective. However, additional research is needed, as the control group consisted of adolescents who did not receive a depression prevention program and thus the results were not compared with an intervention group in which only the adolescents received PRP (Gillham et al., 2006a). The family-based Family Talk program showed that intervention with a family with a depressed parent at the start of adolescence had positive results (Beardslee, Gladstone, Wright, & Cooper, 2003). The program provided parents with information about mood disorders, equipped them with skills to improve

their communication with their children, and taught them to open a dialogue about the depression of the parent. After this intervention, the parental attitude and behavior showed beneficial changes, for instance, parents were able to help their children build more resilience through encouraging friendship and success outside of school, and presumably by consequence, internalizing problems of the children decreased (Beardslee et al., 2013). Other fruitful opportunities may be found in prevention programs that involve the school professionals in other ways than as facilitators of a CBT-based prevention program. One example is the BeyondBlue whole-school approach, which comprises elements to build a supportive school climate, pathways for care and education, and a community forum (Spence et al., 2014). Another example of whole-school approach is a system-wide preventive program in which school staff was trained how to recognize depressive symptoms, how to support social-emotional development in adolescents, and how to engage parents with depression related issues (Beardslee, Ayoub, Avery, Watts, & O'Carroll, 2010). The latter study showed that teachers felt more comfortable and competent in contact with the children. It also showed possible beneficial effects of a teacher having increased skills to interact and coach parents who have to deal with depressive symptoms of their children (Beardslee et al., 2010). Overall, an increased effect size of a depression prevention program may be reached by actively including parents and schools in the intervention.

Integration of OVK in a stepped care approach

All adaptations mentioned in the previous paragraphs – selecting indicated subgroups, changing components of a depression prevention program for adolescents, targeting dependent negative life events, and including parent and teachers - could theoretically be integrated in one stepped care approach that is embedded in the broader school system.

For example, a three-step solution may have the potential to integrate the previously discussed topics. In a first step, the school could promote mental health among the students by fostering a supportive school environment. Such supportive environment could reduce dependent negative life events in the school setting. Additionally, in this first step, a framework could be provided for teachers to improve their skills and educate them about mental health and depression specifically, as was also done in the Mind Matters whole-school approach (Wyn, Chahill, Holdsworth, Rowling, & Carson, 2000). Providing psycho-education about depression to the adolescents could for example be a part of the education about mental health offered by the teachers. In the second step, all adolescents could be screened to select high-risk adolescents. A good example of previous research that has used screening in the school setting is the EMPATHY project conducted in Canada (Silverstone et al., 2015). In that study, adolescents were screened on elevated depressive symptoms and increased risk for suicide and additional problems, such as alcohol and tobacco use. Almost 16% of the adolescents were indicated as high-risk, of which a

substantial proportion reported to be actively suicidal. Dependent on the outcome of the screening of the second step, different actions could be taken in a third step. For those with non-elevated scores, no extra intervention would be needed. For adolescents at high-risk, but not being actively suicidal, an additional depression prevention program, such as an adapted version of OVK, could be included in their school curriculum. Possible adaptations in the OVK program may be to use only the first 8 lessons, as they revealed to be effective for girls with elevated depressive symptoms (Wijnhoven et al., 2014), or to add Behavioral Activation. Extra care could be offered to adolescents who would report to be actively suicidal. They could be seen for a semi-structured clinical interview conducted by a school psychologist to assess the actual suicidal risk (cf. Silverstone et al., 2015). Those who are not found to be at risk for suicide could join participate in OVK in the indicated group, while for those who are at risk for suicide the parents should be informed. A safety plan, including potential referral to specialized mental health care services, should be developed accordingly.

Hence, although we do not have a final solution for how depression prevention should be implemented in the Netherlands, previous research provides knowledge on how to use and further develop the existing programs. A stepped care approach in the school system may provide one of the best opportunities.

Opportunities for future research

The previously described underlying mechanisms and considerations for depression prevention in the future provide opportunities for further research. For instance, the expected underlying mechanisms that are used to develop depression prevention programs should be critically evaluated and tested to determine why certain depression prevention programs work in certain contexts and others do not. Since a negative cognitive style has been found to be prospective for depressive symptoms in adolescents with a highly negative cognitive style (Carter & Garber, 2011), and as indicated prevention efforts with CBT programs result in larger effect sizes compared to universal efforts (Merry et al., 2012), it would be relevant to test whether a negative cognitive style works as the underlying mechanism of a depression prevention program, specifically in adolescents with elevated depressive symptoms. As previously discussed, another possible mechanism underlying depression prevention programs that may be fruitful to focus on is the role of dependent negative life events, especially because it is a modifiable factor. Concerning the suggested stepped care approach, additional research needs to be conducted to determine whether this approach provides an effective and feasible depression prevention strategy.

Another factor that may need more attention in ongoing depression prevention efforts concerns the parent-child relationship. Partly because only few depression

prevention programs include a parent component, the data are inconclusive with regard to the relative efficacy of targeting family factors vs. cognitive or behavioral factors (Restifo & Bögels, 2009). Some trials, however, encourage a combined adolescent and parent strategy compared to an adolescent-only strategy (Lewinsohn, Clarke, Hops, & Andrews, 1990), while other trials do not (Shochet et al., 2001). When investigating a stepped care approach, including informing the parent when their child reports high depressive symptoms (cf. Silverstone et al., 2015), investigators should evaluate the change in parent-child interaction as a result of informing parents. Parents might want to learn additional skills on how to communicate with their child about the depressive symptoms or both the adolescent and parent may need support on how to reduce negative interactions and conflict between parent and teens (Restifo & Bögels, 2009). Because these interpretations remain speculative at this point, further research should focus on whether increasing parental support will provide additional effect in depression prevention efforts.

Another opportunity for effective depression prevention programs would be not to focus on trying to change the adolescents' interaction with the environment (e.g., negative cognitive style or interpersonal skills), but to encourage them to take perspective on their own thoughts and emotions and accept things as they are. Mindfulness based interventions, which are also called 'the third generation of cognitive behavioral therapy', may accomplish this goal. Mindfulness is "the awareness that emerges through paying attention to purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p.145). Although empirical evidence of the efficacy of mindfulness interventions is insufficient to draw general conclusions for children and adolescents (Burke, 2010), meta-analyses of empirical research in adults have shown a medium effect size (d = .50 - .59) on psychological health outcomes and mood symptoms (Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010). The first RCT on the efficacy of a mindfulness-based depression prevention program for adolescents showed significant reductions in depressive symptoms and a medium effect size (d >.30) (Raes, Griffith, Van der Gucht, & Williams, 2014), which indicates that mindfulness may be a fruitful direction to further develop depression prevention efforts.

Future research should also bear in mind that adolescents must be kept motivated during (depression) prevention programs, so that skills will more easily be remembered. It is unclear whether the current OVK-program consisting of 16-lessons that include pen-and-paper exercises meets that criterion. Developing more appealing programs by using multi-media strategies, such as games or mobile phone applications, will be needed in future, irrespective of the specific theoretical model underlying the program elements used. The game Sparx is an example of a depression prevention game (Merry et al., 2011). Sparx is a three dimensional interactive game in which the adolescents choose an avatar to survive in a fantasy world dominated by negative thoughts that need to be encountered.

The game is used to teach cognitive behavior skills to adolescents, and it was found to be a potential alternative to a usual care for adolescents with depressive symptoms (Merry et al., 2011). However, no differences in effectiveness on depressive symptoms between adolescent girls with elevated levels of depressions and a control group or between Sparx and OVK were found in a Dutch study (Poppelaars et al., 2015, submitted). Despite the effort to increase the attractiveness of a CBT-based intervention by using a video game, no motivational differences were found between Sparx and the classroom-based OVK (Poppelaars et al., 2014). Apparently, the Sparx video game, which could also be described as an avatarized CBT-workbook, did not succeed in engaging the adolescents. Hence, the opportunities for using engaging games or interventions that use multi-media seem to be underdeveloped so far. Yet, in the current changing world in which information and communication are increasingly more digitally organized, it seems inevitable to incorporate social media, games, mobile phones or smart watches in depression prevention efforts. Future research should use the emerging insights to identify strategies that appeal to adolescents' interests to augment the program's effect.

From a broader perspective, one could argue that depression prevention programs have mainly focused on intra- and inter-personal processes, and may have missed opportunities to change relevant environmental or societal factors. In contrast, environmental factors are often used to reduce problem behavior, for instance, to reduce triggers by placing restrictions on tobacco and alcohol. As the prevalence of depression and suicide attempts are found to vary across countries, probably due to cultural features that are not understood yet (Weissman et al., 1999), it might be interesting to analyze the potential influence of several characteristics or triggers of our society. For depressive symptoms, one could imagine that high demands of the society, in contrast to intra- and inter-personal factors, influence the development of depressive symptoms among adolescents. For example, high academic pressures and cultural or familial pressure to work hard for several educational qualifications has been found to relate to depressive symptoms (Ang & Huan, 2006; Lee & Larson, 2000; Lee, Wong, Chow, & McBride-Chang, 2006). Moreover, the possibilities and the use of social media have increased tremendously during the last decade (Lenhart, Pucell, Smith, & Zickuhr, 2010), and they may be an important source of exposure to (negative) social comparisons between adolescents. As many youth will post their most impressive and positive experiences online, a growing group of adolescents will be confronted with information that may triggered them to believe that the grass is greener on the other side of the fence. In addition, social media is an easy platform for cyber-bullying, and already more than 11% of the Dutch adolescents report being confronted with this issue (Statline, 2015). Hence, the characteristics of the society, including academic pressures and social media, may be studied in relation to the development and prevention of depressive symptoms in adolescents.

Closing statement

The studies presented in this thesis were among the first in the Netherlands to examine a depression prevention program on a large scale in a school setting. Overall, this thesis provides evidence that the current CBT-based depression prevention program (OVK) does not attenuate (the increase of) depressive symptoms in early adolescents. Since a negative cognitive style did not appear to precede depressive symptoms, it became unclear whether a depression prevention program should shift attention from recognizing and restructuring a negative cognitive style towards other possible underlying mechanisms. In trying to prevent adolescents from developing depressive symptoms, it might be of key importance to acknowledge the role of dependent negative life events and a stepped care approach involving school and parents. Suggestions for research and practice are provided to improve depression prevention programs in school settings, which preferably should include more than just incorporating a CBT-based prevention program into the school curriculum.

References

A

Abela, J. R., Brozina, K., & Haigh, E. P. (2002). An examination of the response styles theory of depression in third-and seventh-grade children: A short-term longitudinal study. *Journal of Abnormal Child Psychology*, *30*, 515-527.

Abela, J. R., & Hankin, B. L. (2011). Rumination as a vulnerability factor to depression during the transition from early to middle adolescence: a multiwave longitudinal study. *Journal of Abnormal Psychology*, *120*, 259-271.

Abela, J. R., & Payne, A. V. (2003). A test of the integration of the hopelessness and self-esteem theories of depression in schoolchildren. *Cognitive Therapy and Research 27*, 519–535.

Abela, J. R., & Seligman, M. E. (2000). The hopelessness theory of depression: A test of the diathesis-stress component in the interpersonal and achievement domains. *Cognitive Therapy and Research, 24*, 361–378.

Abela, J. R., Stolow, D., Mineka, S., Yao, S., Zhu, X. Z., & Hankin, B. L. (2011). Cognitive vulnerability to depressive symptoms in adolescents in urban and rural Hunan, China: A multiwave longitudinal study. *Journal of Abnormal Psychology*, *120*, 765-778.

Abela, J. R., & Sullivan, C. (2003). A test of Beck's cognitive diathesis-stress theory of depression in early adolescents. *The Journal of Early Adolescence*, *23*, 384-404.

Abramson, L.Y., Metalsky, G. I., & Alloy, L. B., (1989). Hopelessness depression: a theory-based subtype of depression. *Psychological Review, 96,* 358–372.

Adamson, P. (2013). *Child Well-being in Rich Countries: A Comparative Overview* (No. inreca683). UNICEF Innocenti Research Centre.

Ajzen, I. (1988). Attitudes, Personality, and Behavior. Dorsey Press, Homewood, IL.

American Psychiatric Association. (2014). *Beknopt overzicht van de criteria DSM-5®,* [*Nederlandse vertaling van Desk Reference to the diagnostic criteria from DSM-5®*.] Amsterdam: p/a Uitgeverij Boom

Anderson, R., Ukoumunne, O. C., Sayal, K., Phillips, R., Taylor, J. A., Spears, M., ... & Stallard, P. (2014). Cost-effectiveness of classroom-based cognitive behaviour therapy in reducing symptoms of depression in adolescents: a trial-based analysis. *Journal of Child Psychology and psychiatry*, *55*, 1390-1397.

Ang, R. P., & Huan, V. S. (2006). Relationship between academic stress and suicidal ideation: Testing for depression as a mediator using multiple regression. *Child Psychiatry and Human Development*, *37*, 133-143.

Angold, A., Erkanli, A., Silberg, J., Eaves, L., & Costello, E. J. (2002). Depression scale scores in 8–17-year-olds: effects of age and gender. *Journal of Child Psychology and Psychiatry*, *43*, 1052-1063.

Araya, R., Fritsch, R., Spears, M., Rojas, G., Martinez, V., Barroilhet, S., ... & Montgomery, A. A. (2013). School intervention to improve mental health of students in Santiago, Chile: a randomized clinical trial. *JAMA Pediatrics*, *167*, 1004-1010.

Arnett, J. J. (1999). Adolescent storm and stress, reconsidered. *American Psychologist*, *54*, 317-326.

Auerbach, R. P., Bigda-Peyton, J. S., Eberhart, N. K., Webb, C. A., & Ho, M. H. (2011). Conceptualizing the prospective relationship between social support, stress, and depressive symptoms among adolescents. *Journal of Abnormal Child Psychology*, *39*, 475-487.

Avenevoli, S., & Merikangas, K. R. (2006). Implications of high-risk family studies for prevention of depression. *American Journal of Preventive Medicine*, *31*, 126-135.

B

Bados, A., Balaguer, G., & Saldaña, C. (2007). The efficacy of cognitive–behavioral therapy and the problem of drop-out. *Journal of Clinical Psychology*, *63*, 585-592.

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical psychology: Science and practice*, *10*, 125-143.

Bagby, R. M., Parker, J. D., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia Scale—I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, *38*, 23-32.

Bagby, R. M., Taylor, G. J., & Parker, J. D. (1994). The twenty-item Toronto Alexithymia Scale—II. Convergent, discriminant, and concurrent validity. *Journal of Psychosomatic Research*, *38*, 33-40.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. Psychological Review, 84, 191–215.

Barrett, P. M., Farrell, L. J., Ollendick, T. H., & Dadds, M. (2006). Long-term outcomes of an Australian universal

prevention trial of anxiety and depression symptoms in children and youth: an evaluation of the friends program. *Journal of Clinical Child and Adolescent Psychology*, *35*, 403-411.

Barreto, S., & McManus, M. (1997). Casting the net for "depression" among ethnic minority children from the high-risk urban communities. *Clinical Psychology Review*, *17*, 823-845.

Barrocas, A. L., & Hankin, B. L. (2011). Developmental pathways to depressive symptoms in adolescence: A multi-wave prospective study of negative emotionality, stressors, and anxiety. *Journal of Abnormal Child Psychology, 39*, 489-500.

Beardslee, W. R., Ayoub, C., Avery, M. W., Watts, C. L., & O'Carroll, K. L. (2010). Family Connections: an approach for strengthening early care systems in facing depression and adversity. *American Journal of Orthopsychiatry*, *80*, 482-495.

Beardslee, W. R., Brent, D. A., Weersing, V. R., Clarke, G. N., Porta, G., Hollon, S. D., ... & Garber, J. (2013). Prevention of depression in at-risk adolescents: Longer-term effects. *JAMA psychiatry*, *70*, 1161-1170.

Beardslee, W. R., Gladstone, T. R., Wright, E. J., & Cooper, A. B. (2003). A family-based approach to the prevention of depressive symptoms in children at risk: evidence of parental and child change. *Pediatrics*, *112*, 119-131.

Beardslee, W. R., Versage, E. M., & Gladstone, T. R. (1998). Children of affectively ill parents: A review of the past 10 years. *Journal of the American Academy of Child & Adolescent Psychiatry*, *37*, 1134-1141.

Beardslee, W. R., Wright, E. J., Gladstone, T. R., & Forbes, P. (2007). Long-term effects from a randomized trial of two public health preventive interventions for parental depression. *Journal of Family Psychology*, *21*, 703-713.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive Therapy of Depression*. New York: Guilford.

Beevers, C. G., Nolen-Hoeksema, S., Rohde, P., & Stice, E. (2007). Recovery From Major Depressive Disorder Among Female Adolescents: A Prospective Test of the Scar Hypothesis. *Journal of Consulting and Clinical Psychology, 75*, 888-900.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238–246.

Bierut, L. J., Heath, A. C., Bucholz, K. K., Dinwiddie, S. H., Madden, P. A., Statham, D. J., ... & Martin, N. G. (1999). Major depressive disorder in a community-based twin sample: are there different genetic and environmental contributions for men and women?. *Archives of General Psychiatry*, *56*, 557-563.

Birmaher, B., Arbelaez, C., & Brent, D. (2002). Course and outcome of child and adolescent major depressive disorder. *Child and Adolescent Psychiatric Clinics of North America*, *11*, 619-637.

Birmaher, B., Ryan, N. D., Williamson, D. E., Brent, D. A., Kaufman, J., Dahl, R. E., … & Nelson, B. (1996). Childhood and adolescent depression: a review of the past 10 years. Part I. *Journal of the American Academy of Child & Adolescent Psychiatry, 35*, 1427-1439.

Borra, R. (2003). Cultuur en psychiatrische diagnostiek: stemmingsstoornissen bij allochtonen depressie cultuur. [Culture and psychiatric diagnostics: mooddisorders in immigrants depression culture]. *Bijblijven*, *19*, 381-393.

Bower, G. H. (1981). Mood and memory. *American Psychologist, 36*, 129–148.

Braet, C., Vlierberghe, L. V., Vandevivere, E., Theuwis, L., & Bosmans, G. (2013). Depression in early, middle and late adolescence: differential evidence for the cognitive diathesis–stress model. *Clinical Psychology & Psychotherapy*, *20*, 369-383.

Brent, D. A., Birmaher, B., Kolko, D., Baugher, M., & Bridge, J. (2001). Subsyndromal depression in adolescents after a brief psychotherapy trial: course and outcome. *Journal of Affective Disorders*, *63*, 51-58.

Brown, J., Cohen, P., Johnson, J. G., & Smailes, E. M. (1999). Childhood abuse and neglect specificity of effects on adolescent and young adult depression and suicidality. *Journal of the American Academy of Child & Adolescent Psychiatry*, *38*, 1490-1496.

Brozina, K., & Abela J. R. Z. (2006). Symptoms of Depression and Anxiety in Children: Specificity of the Hopelessness Theory. *Journal of Clinical Child and Adolescent Psychology, 35*, 515-527.

Bruce, M. L., Takeuchi, D. T., & Leaf, P. J. (1991). Poverty and psychiatric status: longitudinal evidence from the New Haven Epidemiologic Catchment Area Study. *Archives of General Psychiatry*, *48*, 470-474.

Brunwasser, S. M., Gillham, J. E., & Kim, E. S. (2009). A meta-analytic review of the Penn Resiliency Program's effect on depressive symptoms. *Journal of Consulting and Clinical Psychology*, *77*, 1042-1054.

Burke, C. A. (2010). Mindfulness-based approaches with children and adolescents: A preliminary review of current research in an emergent field. *Journal of Child and Family Studies*, *19*, 133-144.

Burke, H. M., Davis, M. C., Otte, C., & Mohr, D. C. (2005). Depression and cortisol responses to psychological stress: a meta-analysis. *Psychoneuroendocrinology*, *30*, 846-856.

Burns, R. A., Butterworth, P., Luszcz, M., & Anstey, K. J. (2013). Stability and change in level of probable depression and depressive symptoms in a sample of middle and older-aged adults. *International Psychogeriatrics, 25*, 303-309.

C

Calear, A. L., & Christensen, H. (2010). Systematic review of school-based prevention and early intervention programs for depression. *Journal of Adolescence*, *33*, 429-438.

Calvete, E. (2011). Temporal relationships between inferential style and depressive symptoms in adolescents. *International Journal of Cognitive Therapy, 4*, 438-457.

Calvete, E., Orue, I., & Hankin, B. L. (2013). Transactional relationships among cognitive vulnerabilities, stressors, and depressive symptoms in adolescence. *Journal of Abnormal Child Psychology*, *41*, 399-410.

Calvete, E., Villardón, L., & Estévez, A. (2008). Attributional style and depressive symptoms in adolescents: an examination of the role of various indicators of cognitive vulnerability. *Behaviour Research and Therapy, 46,* 944–953.

Capron, D. W., Allan, N. P., Ialongo, N. S., Leen-Feldner, E., & Schmidt, N. B. (2015). The depression distress amplification model in adolescents: a longitudinal examination of anxiety sensitivity cognitive concerns, depression and suicidal ideation. *Journal of Adolescence*, *41*, 17-24.

Cardemil, E. V., Reivich, K. J., Beevers, C. G., Seligman, M. E., & James, J. (2007). The prevention of depressive symptoms in low-income, minority children: Two-year follow-up. *Behaviour Research and Therapy, 45*, 313-327.

Carli, V., Hoven, C. W., Wasserman, C., Chiesa, F., Guffanti, G., Sarchiapone, M., ... & Wasserman, D. (2014). A newly identified group of adolescents at "invisible" risk for psychopathology and suicidal behavior: findings from the SEYLE study. *World Psychiatry*, *13*, 78-86.

Carter, J. S., & Garber, J. (2011). Predictors of the first onset of a major depressive episode and changes in depressive symptoms across adolescence: stress and negative cognitions. *Journal of Abnormal Psychology*, *120*, 779-796.

Castelao, C. F., & Kröner-Herwig, B. (2013). Different trajectories of depressive symptoms in children and adolescents: Predictors and differences in girls and boys. *Journal of Youth and Adolescence*, *42*, 1169-1182.

Challen, A. R., Machin, S. J., & Gillham, J. E. (2014). The UK Resilience Programme: A school-based universal nonrandomized pragmatic controlled trial. *Journal of Consulting and Clinical Psychology*, *82*, 75-89.

Chaplin, T. M., Gillham, J. E., Reivich, K., Elkon, A. G., Samuels, B., Freres, D. R., ... & Seligman, M. E. (2006). Depression prevention for early adolescent girls a pilot study of all girls versus co-ed groups. *The Journal of Early Adolescence*, *26*, 110-126.

Cinkaya, F., Schindler, A., & Hiller, W. (2011). When patients drop out of therapy. Characteristics and risk factors of drop out from out-patient psychotherapy. *Zeitschrift fur Klinische Psychologie und Psychotherapie*, *40*, 224-234.

Clarke, G. N., Hawkins, W., Murphy, M., & Sheeber, L. (1993). School-Based Primary Prevention of Depressive Symptomatology in Adolescents Findings from Two Studies. *Journal of Adolescent Research*, *8*, 183-204.

Clarke, G. N., Hawkins, W., Murphy, M., Sheeber, L. B., Lewinsohn, P. M., & Seeley, J. R. (1995). Targeted prevention of unipolar depressive disorder in an at-risk sample of high school adolescents: A randomized trial of a group cognitive intervention. *Journal of the American Academy of Child & Adolescent Psychiatry, 34*, 312-321.

Clarke, G. N., Hornbrook, M., Lynch, F., Polen, M., Gale, J., Beardslee, W., ... & Seeley, J. (2001). A randomized trial of a group cognitive intervention for preventing depression in adolescent offspring of depressed parents. *Archives of General Psychiatry*, 58, 1127-1134.

Clarke, G. N., Rohde, P., Lewinsohn, P. M., Hops, H., & Seeley, J. R. (1999). Cognitive-behavioral treatment of adolescent depression: efficacy of acute group treatment and booster sessions. *Journal of the American Academy of Child & Adolescent Psychiatry*, 38, 272-279.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 385-396.

Cole, D.A., Ciesla, J.A., Dallaire, D.H., Jacquez, F.M., Pineda, A.Q., LaGrange, B. … & Felton, J.W. (2008). Emergence of attributional style and its relation to depressive symptoms. *Journal of Abnormal Psychology, 117*, 16-31.

Cole, D. A., Jacquez, F. M., LaGrange, B., Pineda, A. Q., Truss, A. E., Weitlauf, A. S., … & Dufton, L. (2011). A longitudinal study of cognitive risks for depressive symptoms in children and young adolescents. *The Journal of Early Adolescence, 31*, 782-816.

Collins, K. A., & Dozois, D. J. (2008). What are the active ingredients in preventative interventions for depression? *Clinical Psychology: Science and Practice*, *15*, 313-330.

Costello, J.E., Erkanli, A., & Angold, A. (2006). Is there an epidemic of child or adolescent depression?. *Journal of Child Psychology and Psychiatry, 47*, 1263-1271.

Crick, N. R., & Dodge, K. A. (1996). Social information-processing mechanisms in reactive and proactive aggression. *Child Development*, *67*, 993-1002.

Cuijpers, P., van Straten, A., Smit, F., Mihalopoulos, C., & Beekman, A. (2008). Preventing the onset of depressive disorders: a meta-analytic review of psychological interventions. *American Journal of Psychiatry, 165*, 1272-1280.

Currie, C., Zanotti, C., Morgan, A., Currie, D., Looze, M. de, Roberts, C., …. Barnekow, V., (2012). Social determinants of health and well-being among young people. Health Behaviour in School-aged Children (HBSC) study: international report from the 2009/2010 survey. Kopenhagen: WHO Regional Office for Europe

D

Daley, S. E., Hammen, C., Burge, D., Davila, J., Paley, B., Lindberg, N., & Herzberg, D. S. (1997). Predictors of the generation of episodic stress: A longitudinal study of late adolescent women. *Journal of Abnormal Psychology*, *106*, 251.

Davies, P., & Windle, M. (2001). Interparental discord and adolescent adjustment trajectories: The potentiating and protective role of intrapersonal attributes. *Child Development*, *72*, 1163-1178.

De Cuyper, S., Timbremont, B., Braet, C., De Backer, V., & Wullaert, T. (2004). Treating depressive symptoms in schoolchildren. European child & adolescent psychiatry, 13(2), 105-114.

De Graaf, R., Ten Have, M., Van Gool, C., Van Dorsselaer, S., (2012). Prevalence of mental disorders, and trends from 1996 to 2009. Results from the Netherlands Mental Health Survey and Incidence Study-2. *Social Psychiatry and Psychiatric Epidemiology, 47*, 203-213.

De Looze, M., Van Dorsselaer, S., De Roos, S., Verdurmen, J., Stevens, G., Gommans, R., Van Bon-Martens, M., Ter Bogt, T., & Vollebergh, W. (2014). Gezondheid, welzijn en opvoeding van jongeren in Nederland : HBSC-2013 : Health Behavior in School-aged Children. Utrecht: Universiteit Utrecht.

De Vries, H., Engels, R., Kremers, S., Wetzels, J., & Mudde, A. (2003). Parents' and friends' smoking status as predictors of smoking onset: findings from six European countries. *Health Education Research*, *18*, 627-636.

Dean, K., Stevens, H., Mortensen, P. B., Murray, R. M., Walsh, E., & Pedersen, C. B. (2010). Full spectrum of psychiatric outcomes among offspring with parental history of mental disorder. *Archives of General Psychiatry*, *67*, 822-829.

DiBartolo, P. M., Albano, A. M., Barlow, D. H., & Heimberg, R. G. (1998). Cross-informant agreement in the assessment of social phobia in youth. *Journal of Abnormal Child Psychology, 26*, 631–655.

DiBartolo, P. M., & Grills, A. E. (2006). Who is best at predicting children's anxiety in response to a social evaluative task?: A comparison of child, parent, and teacher reports. *Journal of Anxiety Disorders*, *20*, 630–645.

Dimidjian, S., Barrera Jr, M., Martell, C., Muñoz, R. F., & Lewinsohn, P. M. (2011). The origins and current status of behavioral activation treatments for depression. *Annual Review of Clinical Psychology*, *7*, 1-38.

Dimidjian, S., Hollon, S. D., Dobson, K. S., Schmaling, K. B., Kohlenberg, R. J., Addis, M. E., ... & Jacobson, N. S. (2006). Randomized trial of behavioral activation, cognitive therapy, and antidepressant medication in the acute treatment of adults with major depression. *Journal of Consulting and Clinical Psychology*, *74*, 658-670.

Dolphin, L., & Hennessy, E. (2014). Adolescents' perceptions of peers with depression: An attributional analysis. *Psychiatry Research*, *218*, 295-302.

Duncan, T. E., Duncan, S. C., Strycker, L. A. *An introduction to latent variable growth curve modeling: Concepts, issues, and applications.* Mahwah, NJ: Erlbaum; 2006.

E

Engels, R. C., & Knibbe, R. A. (2000). Alcohol use and intimate relationships in adolescence: When love comes to town. *Addictive Behaviors*, *25*, 435-439.

Engels, R. C., Knibbe, R. A., & Drop, M. J. (1999). Why do late adolescents drink at home? A study on psychological well-being, social integration and drinking context. *Addiction Research*, *7*, 31-46.

Evans, E., Hawton, K., & Rodham, K. (2004). Factors associated with suicidal phenomena in adolescents: a systematic review of population-based studies. *Clinical Psychology Review*, *24*, 957-979.

Evers, A., van Vliet-Mulder, J. C., Groot, C. J. (2000). *COTAN Documentatie van tests en testresearch in Nederland [COTAN documentation on tests and test research in The Netherlands].* Amsterdam, The Netherlands: Boom Test Uitgevers.

Evers, A., Braak, M. S. L., Frima, R. M., & van Vliet-Mulder, J. C. (2009-2011). *COTAN Documentatie.* [COTAN documentation]. Amsterdam: Boom test uitgevers.

F

Fergusson, D. M., & Woodward, L. J. (2002). Mental health, educational, and social role outcomes of adolescents with depression. *Archives of General Psychiatry, 59,* 225-231.

Forbes, E., Hariri, A., Martin, S., Silk, J., Moyles, D., Fisher, P., ... & Dahl, R. (2009). Altered striatal activation predicting real-world positive affect in adolescent major depressive disorder. *American Journal of Psychiatry, 166*, 64-73.

Forgas, J. P. (1994). Sad and guilty? Affective influences on the explanation of conflict episodes. *Journal of Personality and Social Psychology, 66,* 56–68.

Forgas, J. P. (1998). Happy and mistaken? Mood effects on the fundamental attribution error. *Journal of Personality and Social Psychology, 75*, 318–331.

Franić, S., Middeldorp, C. M., Dolan, C. V., Ligthart, L., & Boomsma, D. I. (2010). Childhood and adolescent anxiety and depression: beyond heritability. *Journal of the American Academy of Child & Adolescent Psychiatry*, *49*, 820-829.

G

Garber, J. (2006). Depression in children and adolescents: linking risk research and prevention. *American Journal of Preventive Medicine*, *31*, 104-125.

Garber, J., Clarke, G. N., Weersing, V. R., Beardslee, W. R., Brent, D. A., Gladstone, T. R., ... & Iyengar, S. (2009). Prevention of depression in at-risk adolescents: a randomized controlled trial. *Jama*, *301*, 2215-2224.

Garber, J., Keiley, M. K., & Martin, N. C. (2002). Developmental trajectories of adolescents' depressive symptoms: predictors of change. *Journal of Consulting and Clinical Psychology*, *70*, 79-95.

Garratt, G., Ingram, R. E., Rand, K. L., & Sawalani, G. (2007). Cognitive processes in cognitive therapy: Evaluation of the mechanisms of change in the treatment of depression. *Clinical Psychology: Science and Practice, 14*, 224–239.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming*, *33*, 441-467.

Ge, X., Lorenz, F. O., Conger, R. D., Elder, G. H., & Simons, R. L. (1994). Trajectories of stressful life events and depressive symptoms during adolescence. *Development Psychology*, *30*, 467-483.

Ge, X., Natsuaki, M. N., & Conger, R. D. (2006). Trajectories of depressive symptoms and stressful life events among male and female adolescents in divorced and nondivorced families. *Development and Psychopathology*, *18*, 253-273.

Ge, X., Natsuaki, M. N., Neiderhiser, J. M., & Reiss, D. (2009). The longitudinal effects of stressful life events on adolescent depression are buffered by parent–child closeness. *Development and Psychopathology*, *21*, 621-635.

Gezondheidsenquete 2013, Centraal Bureau Statistiek. Retrieved from: http://www.nji.nl/nl/Depressie-Probleem-schets-Cijfers-Cijfers-over-angst--en- stemmingsproblemen (august 2015).

Gibb, B. E., & Alloy, L. B. (2006). A prospective test of the hopelessness theory of depression in children. *Journal of Clinical Child and Adolescent Psychology, 35*, 264–274.

Gibb, B. E., & Coles, M. E. (2005). Cognitive vulnerability-stress models of psychopathology. *Development of psychopathology: A vulnerability-stress perspective*, 104-135.

Gillham, J. E., Brunwasser, S. M., & Freres, D. R. (2008). Preventing depression in early adolescence: The Penn Resiliency Program. In J. R. Z. Abela & B. L. Hankin (Eds.), *Handbook of depression in children and adolescents*. (pp. 309–322). New York, NY: Guilford Press.

Gillham, J. E., Hamilton, J., Freres, D. R., Patton, K., & Gallop, R. (2006b). Preventing depression among early adolescents in the primary care setting: A randomized controlled study of the Penn Resiliency Program. *Journal of Abnormal Child Psychology*, *34*, 195-211.

Gillham, J. E., Reivich, K. J., Brunwasser, S. M., Freres, D. R., Chajon, N. D., Kash-MacDonald, V. M., ... & Seligman, M. E. (2012). Evaluation of a group cognitive-behavioral depression prevention program for young adolescents: A randomized effectiveness trial. *Journal of Clinical Child & Adolescent Psychology*, *41*, 621-639.

Gillham, J. E., Reivich, K. J., Freres, D. R., Chaplin, T. M., Shatté, A. J., Samuels, B., ... & Seligman, M. E. (2007). School-based prevention of depressive symptoms: A randomized controlled study of the effectiveness and specificity of the Penn Resiliency Program. *Journal of Consulting and Clinical Psychology*, *75*, 9-19.

Gillham, J. E., Reivich, K. J., Freres, D. R., Lascher, M., Litzinger, S., Shatté, A., & Seligman, M. E. (2006a). School-based prevention of depression and anxiety symptoms in early adolescence: A pilot of a parent intervention component. *School Psychology Quarterly*, *21*, 323-348.

Gillham, J. E., Reivich, K. J., Jaycox, L. H., & Seligman, M. E. P. (1995). Preventing depressive symptoms in schoolchildren: Two year follow-up. *Psychological Science, 6,* 343–351.

Gladstone, T. R. & Kaslow, N. J. (1995). Depression and attributions in children and adolescents: A meta-analytic review. *Journal of Abnormal Child Psychology, 23*, 597–606.

Gladstone, T. R., Kaslow, N. J., Seeley, J. R., & Lewinsohn, P. M. (1997). Sex differences, attributional style, and depressive symptoms among adolescents. *Journal of Abnormal Child Psychology*, *25*, 297-306.

Glied, S., & Pine, D. S. (2002). Consequences and correlates of adolescent depression. *Archives of Pediatrics & Adolescent Medicine, 156*, 1009-1014.

Gortner, E. T., Gollan, J. K., Dobson, K. S., & Jacobson, N. S. (1998). Cognitive–behavioral treatment for depression: Relapse prevention. *Journal of Consulting and Clinical Psychology, 66*, 377-384.

Gottfredson, D. C., & Wilson, D. B. (2003). Characteristics of effective school-based substance abuse prevention. *Prevention Science*, *4*, 27-38.

Gotlib, I. H., Hamilton, J. P., Cooney, R. E., Singh, M. K., Henry, M. L., & Joormann, J. (2010). Neural processing of reward and loss in girls at risk for major depression. *Archives of General Psychiatry, 67*, 380-387.

Gotlib, I. H., & Krasnoperova, E. (1998). Biased information processing as a vulnerability factor for depression. *Behavior Therapy*, *29*, 603-617.

Gotlib, I. H., Krasnoperova, E., Yue, D. N., & Joormann, J. (2004). Attentional biases for negative interpersonal stimuli in clinical depression. *Journal of Abnormal Psychology, 113*, 127.

Gotlib, I. H., Lewinsohn, P. M., & Seeley, J. R. (1998). Consequences of depression during adolescence: marital status and marital functioning in early adulthood. *Journal of Abnormal Psychology, 107*, 686-690.

Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology, 60*, 549-576.

Granic, I., Lobel, A., & Engels, R. C. (2014). The benefits of playing video games. *American Psychologist*, *69*, 66-78.

Grant, K. E., Compas, B. E., Stuhlmacher, A. F., Thurm, A. E., McMahon, S. D., & Halpert, J. A. (2003). Stressors and child and adolescent psychopathology: moving from markers to mechanisms of risk. *Psychological Bulletin*, *129*, 447-466.

Grant, K. E., Compas, B. E., Thurm, A. E., McMahon, S. D., Gipson, P. Y., Campbell, A. J., ... & Westerholm, R. I. (2006). Stressors and child and adolescent psychopathology: Evidence of moderating and mediating effects. *Clinical Psychology Review*, *26*, 257-283.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research*, *57*, 35-43.

H

Haeffel, G. J., & Howard, G. S. (2010). Self-report: Psychology's four letter word. The American Journal of Psychology, 123, 181–188.

Hammen, C. (1991). Generation of stress in the course of unipolar depression. *Journal of Abnormal Psychology, 100*, 555.

Hammen, C. (2005). Stress and depression. *Annual Review of Clinical Psychology, 1*, 293-319.

Hallfors, D., & Godette, D. (2002). Will thePrinciples of Effectiveness' improve prevention practice? Early findings from a diffusion study. *Health Education Research*, *17*, 461-470.

Hankin, B. L. (2006). Adolescent depression: Description, causes, and interventions. *Epilepsy & Behavior, 8*, 102-114.

Hankin, B. L. (2008a). Stability of cognitive vulnerabilities to depression: A short-term prospective multi-wave study. *Journal of Abnormal Psychology, 117,* 324-333.

Hankin, B. L. (2008b). Cognitive vulnerability-stress model of depression during adolescence: Investigating depressive symptom specificity in a multi-wave prospective study. *Journal of Abnormal Child Psychology, 36*, 99-1014.

Hankin, B. L. (2009). Development of sex differences in depressive and co-occurring anxious symptoms during adolescence: Descriptive trajectories and potential explanations in a multi- wave prospective study. *Journal of Clinical Child and Adolescent Psychology*, 38, 460–472.

Hankin, B. L., & Abramson, L. Y. (2001). Development of gender differences in depression: An elaborated cognitive vulnerability–transactional stress theory. *Psychological Bulletin, 127*, 773-796.

Hankin, B. L., & Abramson, L. Y. (2002). Measuring cognitive vulnerability to depression in adolescence: Reliability, validity, and gender differences. *Journal of Clinical Child and Adolescent Psychology*, *31*, 491-504.

Hankin, B. L., Abramson, L. Y., Moffitt, T. E., McGee, R., Silva, P. A., & Angell, K. E. (1998). Development of depression from preadolescence to young adulthood: emerging gender differences in a 10-year longitudinal study. *Journal Abnormal Psychology, 107*, 128–140.

Hankin, B. L., Abramson, L. Y., & Siler, M. (2001). A prospective test of the hopelessness theory of depression in adolescence. *Cognitive Therapy and Research*, *25*, 607-632.

Hankin, B. L., Fraley, R. C., & Abela, J. R. (2005). Daily depression and cognitions about stress: evidence for a traitlike depressogenic cognitive style and the prediction of depressive symptoms in a prospective daily diary study. *Journal of Personality and Social Psychology*, *88*, 673.

Hawker, D. S., & Boulton, M. J. (2000). Twenty years' research on peer victimization and psychosocial maladjustment: a meta-analytic review of cross-sectional studies. *Journal of Child Psychology and Psychiatry*, *41*, 441-455.

Hilderink, I., van't Land, H., & Smits, C. (2009). Drop-out onder allochtone GGZ-cliënten. *Zicht op onderliggende factoren en aanbevelingen om drop-out te verminderen.* [*A view on underlying factors and recommendations to diminish drop-out*]. Utrecht, Trimbos-instituut.

Hiemstra, M., Ringlever, L., Otten, R., van Schayck, O. C., Jackson, C., & Engels, R. C. (2014). Long-term effects of a home-based smoking prevention program on smoking initiation: a cluster randomized controlled trial. *Preventive Medicine*, *60*, 65-70.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, *78*, 169-183.

Horowitz, J. L., & Garber, J. (2006). The prevention of depressive symptoms in children and adolescents: a meta-analytic review. *Journal of Consulting and Clinical Psychology*, *74*, 401-415.

Horowitz, J. L., Garber, J., Ciesla, J. A., Young, J. F., & Mufson, L. (2007). Prevention of depressive symptoms in adolescents: a randomized trial of cognitive-behavioral and interpersonal prevention programs. *Journal of Consulting and Clinical Psychology*, *75*, 693.

Hosman, C. M., van Doesum, K. T., & van Santvoort, F. (2009). Prevention of emotional problems and psychiatric risks in children of parents with a mental illness in the Netherlands: I. The scientific basis to a comprehensive approach. *Australian e-Journal for the Advancement of Mental health*, *8*, 250-263.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1–55.

Hyde, J. S., Mezulis, A. H., & Abramson, L. Y. (2008). The ABCs of depression: integrating affective, biological, and cognitive models to explain the emergence of the gender difference in depression. *Psychological Review*, *115*, 291.

I

Iacobucci, D. (2010). Structural equations modeling: Fit indices, sample size, and advanced topics. *Journal of Consumer Psychology*, *20*, 90-98.

J

Jacobson, N. S., Dobson, K. S., Truax, P. A., Addis, M. E., Koerner, K., Gollan, J. K., ... & Prince, S. E. (1996). A component analysis of cognitive-behavioral treatment for depression. *Journal of Consulting and Clinical Psychology*, *64*, 295-304.

Jacobson, N. S., & Gortner, E. T. (2000). Can depression be de-medicalized in the 21st century: scientific revolutions, counter-revolutions and the magnetic field of normal science. *Behaviour Research and Therapy*, *38*, 103-117.

Jaycox, L. H., Reivich, K. J., Gillham, J., & Seligman, M. E. (1994). Prevention of depressive symptoms in school children. *Behaviour Research and Therapy*, *32*, 801-816.

Johnson, J. G., & Miller, S. M. (1990). Attributional, life-event, and affective predictors of onset of depression, anxiety, and negative attributional style. *Cognitive Therapy and Research*, *14*, 417-430.

Joiner, T., & Coyne, J. C. (1999). The interactional nature of depression. *Washington, DC: American Psychological Association*.

Joiner, T. E., & Wagner, K. D. (1995). Attributional style and depression in children and adolescents: A meta-analytic review. *Clinical Psychology Review*, *15*, 777-798.

Jung, T., & Wickrama, K. A. S. (2008). An introduction to latent class growth analysis and growth mixture modeling. *Social and Personality Psychology Compass*, *2*, 302-317.

K

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: past, present, and future. *Clinical psychology: Science and practice*, *10*, 144-156.

Kalmijn, W. M., Arends, L. R., & Veenhoven, R. (2011). Happiness scale interval study. Methodological considerations. *Social Indicators Research*, *102*, 497-515.

Kass, R. E., & Wasserman, L. (1995). A reference Bayesian test for nested hypotheses and its relationship to the Schwarz criterion. *Journal of the American Statistical Association*, *90*, 928-934.

Kazdin, A.E. (1994). Informant variability in the assessment of childhood depression. In W.M. Reynolds & H.F. Johnston (Eds.), Handbook of depression in children and adolescents (pp. 249–271). New York: Plenum Press.

Kazdin, A. E. (2007). Mediators and mechanisms of change in psychotherapy research. *Annual Review of Clinical Psychology*, *3*, 1-27.

Kendler, K. S., Gardner, C. O., Neale, M. C., & Prescott, C. A. (2001). Genetic risk factors for major depression in men and women: similar or different heritabilities and same or partly distinct genes?. *Psychological Medicine*, *31*, 605-616.

Kendler, K. S., Gatz, M., Gardner, C. O., & Pedersen, N. L. (2006). A Swedish national twin study of lifetime major depression. *American Journal of Psychiatry*, *163*, 109-114.

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H. U. (2012). Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. *International Journal of Methods in Psychiatric Research*, *21*, 169-184.

Kim-Cohen, J., Caspi, A., Moffitt, T.E., Harrington, H., Milne, B. J., & Poulton, R. (2003). Prior juvenile diagnoses in adults with mental disorder - developmental follow-back of a prospective-longitudinal cohort. *Archives of General Psychiatry, 60*, 709 -717.

Kindt, K. C. M., Kleinjan, M., Janssens, J. M. A. M., & Scholte, R. H. J. (2014). Evaluation of a school-based depression prevention program among adolescents from low-income areas: A randomized controlled effectiveness trial. *International Journal of Environmental Research and Public Health*, *11*, 5273-5293.

Kindt, K. C. M., Scholte, R. H. J., Schuck, K., Kleinjan, M., & Janssens, J. M. A. M (2015). Examining Reciprocal Associations Between a Negative Cognitive Style and Depressive Symptoms in Early Adolescence. *International Journal of Cognitive Therapy*, *8*, 78-94.

Kindt, K. C. M., van Zundert, R., & Engels, R. C. M. E. (2012). Evaluation of a Dutch school-based depression prevention program for youths in high-risk neighborhoods: Study protocol of a two-armed randomized controlled trial. *BMC Public Health*, *12*, 212.

Kirmayer, L. J., & Young, A. (1998). Culture and somatization: clinical, epidemiological, and ethnographic perspectives. *Psychosomatic Medicine*, *60*, 420-430.

Klein, H. J., Noe, R. A., & Wang, C. (2006). Motivation to learn and course outcomes: The impact of delivery mode, learning goal orientation, and perceived barriers and enablers. *Personnel Psychology*, *59*, 665-702.

Kleinjan, M., Vitaro, F., Wanner, B., Brug, J., Van den Eijnden, R. J., & Engels, R. C. M. E. (2012). Predicting nicotine dependence profiles among adolescent smokers: the roles of personal and social-environmental factors in a longitudinal framework. *BMC Public Health*, *12*, 196.

Kolko, D. J., Brent, D. A., Baugher, M., Bridge, J., & Birmaher, B. (2000). Cognitive and family therapies for adolescent depression: Treatment specificity, mediation, and moderation. *Journal of Consulting and Clinical Psychology*, *68*, 603-614.

Koning, I. M., Van den Eijnden, R. J., Engels, R. C., Verdurmen, J. E., & Vollebergh, W. A. (2011). Why target early adolescents and parents in alcohol prevention? The mediating effects of self-control, rules and attitudes about alcohol use. *Addiction*, *106*, 538-546.

Koning, I. M., Vollebergh, W. A., Smit, F., Verdurmen, J. E., Van Den Eijnden, R. J., Ter Bogt, T. F., ... & Engels, R. C. (2009). Preventing heavy alcohol use in adolescents (PAS): cluster randomized trial of a parent and student intervention offered separately and simultaneously. *Addiction*, *104*, 1669-1678.

Kösters, M. P., Chinapaw, M. J., Zwaanswijk, M., Van der Wal, M. F., Utens, E. M., & Koot, H. M. (2012). Study design of 'FRIENDS for Life': process and effect evaluation of an indicated school-based prevention programme for childhood anxiety and depression. *BMC Public Health, 12*, 86.

Kovacs, M. (1984). The Children's Depression, Inventory (CDI). *Psychopharmacology Bulletin*, *21*, 995-998.

Kramer, J., Conijn, B., Oijevaar, P., & Riper, H. (2014). Effectiveness of a web-based solution-focused brief chat treatment for depressed adolescents and young adults: randomized controlled trial. *Journal of Medical Internet research*, 16, e141.

Kremers, S. P. J., Mudde, A. N., & De Vries, H. (2001). "Kicking the initiation": Do adolescent ex-smokers differ from other groups within the initiation continuum?. *Preventive Medicine*, *33*, 392-401.

Kuperminc, G. P., Leadbeater, B. J., & Blatt, S. J. (2001). School social climate and individual differences in vulnerability to psychopathology among middle school students. *Journal of School Psychology*, *39*, 141-159.

L

LaGrange, B., Cole D. A., Jacques, F., Ciesla, J., Dallaire, D., Pineda, A., … & Felton, J. (2011). Disentangling the prospective relations between maladaptive cognitions and depressive symptoms. *Journal of Abnormal Psychology, 120*, 511-527.

Lakdawalla, Z., Hankin, B. L., & Mermelstein, R. (2007). Cognitive theories of depression in children and adolescents: A conceptual and quantitative review. *Clinical Child and Family Psychology Review, 10*, 1-24.

Lee, M., & Larson, R. (2000). The Korean 'examination hell': Long hours of studying, distress, and depression. *Journal of Youth and Adolescence*, *29*, 249-271.

Lee, M. T., Wong, B. P., Chow, B. W. Y., & McBride-Chang, C. (2006). Predictors of suicide ideation and depression in Hong Kong adolescents: Perceptions of academic and family climates. *Suicide and Life-Threatening Behavior*, *36*, 82-96.

Leitenberg, H., Yost, L. W., & Carroll-Wilson, M. (1986). Negative cognitive errors in children: questionnaire development, normative data, and comparisons between children with and without self-reported symptoms of depression, low self-esteem, and evaluation anxiety. *Journal of Consulting and Clinical Psychology*, *54*, 528-536.

Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2010). Social Media & Mobile Internet Use among Teens and Young Adults. Millennials. *Pew Internet & American Life Project*. Retrieved from: http://files.eric.ed.gov/fulltext/ED525056.pdf

Lerner, J. S., & Keltner, D. (2000). Beyond valence: toward a model of emotion-specific influences on judgment and choice. *Cognition and Emotion*, 14, 473–493.

Lewinsohn, P. M., Clarke, G. N., Hops, H., & Andrews, J. (1990). Cognitive-behavioral treatment for depressed adolescents. *Behavior Therapy*, *21*, 385-401.

Lewinsohn, P. M., Rohde, P., Seeley, J. R., Klein, D. N., & Gotlib, I. H. (2000). Natural course of adolescent major depressive disorder in a community sample: predictors of recurrence in young adults. *American Journal of Psychiatry*, *157*, 1584-1591.

Lewinsohn, P. M., Steinmetz, J. L., Larson, D. W., & Franklin, J. (1981). Depression-related cognitions: Antecedent or consequence? Journal of Abnormal Psychology, 90, 213–219.

Lieb, R., Isensee, B., Hofler, M., Pfister, H., & Wittchen, H. U. (2002). Parental major depression and the risk of depression and other mental disorders in offspring: a prospective-longitudinal community study. *Archives of General Psychiatry*, *59*, 365-374.

Lima-Serrano, M., & Lima-Rodríguez, J. S. (2014). Impact of school-based health promotion interventions aimed at different behavioral domains: a systematic review. *Gaceta Sanitaria*, *28*, 411-417.

Lo, Y., Mendell, N. R., & Rubin, D. B. (2001). Testing the number of components in a normal mixture. *Biometrika*, *88*, 767-778.

Lopez-Duran, N. L., Kovacs, M., & George, C. J. (2009). Hypothalamic–pituitary–adrenal axis dysregulation in depressed children and adolescents: A meta-analysis. *Psychoneuroendocrinology*, *34*, 1272-1283.

Lynch, F. L., & Clarke, G. N. (2006). Estimating the economic burden of depression in children and adolescents. *American Journal of Preventive Medicine*, *31*, 143-151.

Lynch, F. L., Hornbrook, M., Clarke, G. N., Perrin, N., Polen, M. R., O'Connor, E., & Dickerson, J. (2005). Cost-effectiveness of an intervention to prevent depression in at-risk teens. *Archives of General Psychiatry*, *62*, 1241-1248.

M

MacKinnon, D. P., Fairchild, A.J., Fritz, M.S. (2007). Mediation analysis. *Annual Review of Psychology, 58,* 593-614.

Maric, M., Heyne, D. A., van Widenfelt, B. M., & Westenberg, P. M. (2011). Distorted cognitive processing in youth: the structure of negative cognitive errors and their associations with anxiety. *Cognitive Therapy and Research*, *35*, 11-20.

McCarty, C. A., Stoep, A. V., & McCauley, E. (2007). Cognitive features associated with depressive symptoms in adolescence: Directionality and specificity. *Journal of Clinical Child and Adolescent Psychology*, *36*, 147-158.

Malmberg, M., Kleinjan, M., Overbeek, G., Vermulst, A., Monshouwer, K., Lammers, J., ... & Engels, R. C. (2014). Effectiveness of the 'Healthy School and Drugs' prevention programme on adolescents' substance use: a randomized clustered trial. *Addiction*, *109*, 1031-1040.

Meijer, S. A., Smit, F., Schoemaker, C. G., & Cuijpers, P. (2006). Gezond verstand: evidence-based preventive van psychische stoornissen [Common sense: Evidence-based prevention of mental disorders]. De Bilt: RIVM, centrum Volksgezondheid Toekomst Verkenningen en Trimbos-instituut, centrum Preventie en Kortdurende interventie.

Merry, S. N. (2007). Prevention and early intervention for depression in young people–a practical possibility? *Current Opinion in Psychiatry*, *20*, 325-329.

Merry, S. N., Hetrick, S. E., Cox, G. R., Brudevold- Iversen, T., Bir, J. J., & McDowell, H. (2012). Cochrane Review: Psychological and educational interventions for preventing depression in children and adolescents. *Evidence-Based Child Health: A Cochrane Review Journal*, *7*, 1409-1685.

Merry, S., McDowell, H., Hetrick, S., Bir, J., & Muller, N. (2004). Psychological and/or educational interventions for the prevention of depression in children and adolescents. *Cochrane Database Systematic Reviews*, *2*.

Merry, S. N., Stasiak, K., Shepherd, M., Frampton, C., Fleming, T., & Lucassen, M. F. (2012). The effectiveness of SPARX, a computerised self help intervention for adolescents seeking help for depression: randomised controlled non-inferiority trial. *Bmj, 344*, e2598.

Metalsky, G. I., Abramson, L. Y., Seligman, M. E., Semmel, A., & Peterson, C. (1982). Attributional styles and life events in the classroom: Vulnerability and invulnerability to depressive mood reactions. *Journal of Personality and Social Psychology*, *43*, 612-617.

Mezulis, A. H., Funasaki, K. S., Charbonneau, A. M., & Hyde, J. S. (2010). Gender differences in the cognitive vulnerability-stress model of depression in the transition to adolescence. *Cognitive Therapy and Research*, *34*, 501-513.

Mezulis, A., Funasaki, K., & Hyde, J. S. (2011). Negative cognitive style trajectories in the transition to adolescence. *Journal of Clinical Child & Adolescent Psychology*, *40*, 318-331.

Mezulis, A., Salk, R. H., Hyde, J. S., Priess-Groben, H. A., & Simonson, J. L. (2014). Affective, biological, and cognitive predictors of depressive symptom trajectories in adolescence. *Journal of Abnormal Child Psychology*, *42*(4), 539-550.

Ministerie van Volksgezondheid, Welzijn en Sport (2006). Kiezen voor gezond leven 2007-2010 [Choose healthy living 2007-2010]. *Den Haag: Ministerie van VWS*. Retrieved from: http://www.rijksoverheid.nl/documenten-en-publicaties/brochures/2007/01/31/ preventienota-kiezen-voor-gezond-leven.html

Moher, D., Schulz, K. F., & Altman, D. G. (2001). The CONSORT statement: revised recommendations for improving the quality of reports of parallel group randomized trials. *BMC Medical Research Methodology*, *1*, 2.

Monroe, S. M., Rohde, P., Seeley, J. R., & Lewinsohn, P. M. (1999). Life events and depression in adolescence: relationship loss as a prospective risk factor for first onset of major depressive disorder. *Journal of Abnormal Psychology*, *108*, 606-614.

Mufson, L., Nomura, Y., & Warner, V. (2002). The relationship between parental diagnosis, offspring temperament and offspring psychopathology: A longitudinal analysis. *Journal of Affective Disorders*, *71*, 61-69.

Muñoz, R. F., Cuijpers, P., Smit, F., Barrera, A. Z., & Leykin, Y. (2010). Prevention of major depression. *Annual Review of Clinical Psychology*, *6*, 181-212.

Muthén, B. O. (1994). Multilevel covariance structure analysis. *Sociological Methods & Research, 22*, 376-398.

Muthén, L. K, & Muthén, B. O. (2007). *Mplus user's guide* (5th edition.). Los Angeles, CA: Muthén & Muthén.

N

Nagin, D. S. (1999). Analyzing developmental trajectories: a semiparametric, group-based approach. *Psychological Methods*, *4*, 139.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, *100*, 569-582.

Nolen-Hoeksema, S., & Girgus, J. S. (1994). The emergence of gender differences in depression during adolescence. *Psychological Bulletin*, *115*, 424-443.

Nolen-Hoeksema, S., Girgus, J., & Seligman, M. E. P. (1992). Predictors and consequences of childhood depressive symptoms: A 5-Year Longitudinal Study. *Journal of Abnormal Psychology, 101,* 405–422.

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling*, *14*, 535-569.

P

Patton, G. C., Coffey, C., Posterino, M., Carlin, J. B., & Bowes, G. (2003). Life events and early onset depression: Cause or consequence? *Psychological Medicine*, *33*, 1203-1210.

Pattison, C., & Lynd-Stevenson, R. M. (2001). The prevention of depressive symptoms in children: The immediate and long-term out- comes of a school based program. *Behaviour Change*, *18,* 92– 102.

Pine, D. S., Cohen, E., Cohen, P., & Brook, J. (1999). Adolescent depressive symptoms as predictors of adult depression: moodiness or mood disorder? *The American Journal of Psychiatry,* 156, 133-135.

Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, *95*, 667-686.

Pintrich, P. R., Marx, R., & Boyle, R. (1993). Beyond "cold" conceptual change: The role of motivational beliefs and classroom contextual factors in the process of conceptual change. *Review of Educational Research, 63*, 167–199.

Poppelaars, M., Tak, Y. R., Lichtwarck-Aschoff, A., Engels, R. C. M. E., Lobel, A., Merry, S. N., ...& Granic, I. (2015, submitted). Randomized Controlled Trial Comparing a School-Based Cognitive-Behavioral Program (Op Volle Kracht) and a Computerized Program (SPARX) for Adolescent Girls with Subclinical Depression. *Behaviour Research and Therapy.*

Poppelaars, M., Tak, Y. R., Lichtwarck-Aschoff, A., Engels, R. C. M. E., Lobel, A., Merry, S. N., ...& Granic, I. (2014). Autonomous and Controlled Motivation in a Randomized Controlled Trial Comparing School-based and Computerized Depression Prevention Programs. In *Games for Health 2014*, 125-135.

Pössel, P., Baldus, C., Horn, A. B., Groen, G., & Hautzinger, M. (2005). Influence of general Self-efficacy on the effects of a school-based universal primary prevention program of depressive symptoms in adolescents: a randomized and controlled follow-up study. *Journal of Child Psychology and Psychiatry*, *46*, 982-994.

Pössel, P., Horn, A., Groen, G., & Hautzinger, M. (2004). School-based prevention of depressive symptoms in adolescents: A six-month follow- up. *Journal of the American Academy of Child and Adolescent Psychiatry, 43,* 1003–1010.

Pössel, P., Seemann, S., & Hautzinger, M. (2008). Impact of comorbidity in prevention of adolescent depressive symptoms. *Journal of Counseling Psychology*, *55*, 106-117.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of the structure of change. In *Self Change* (pp. 87-114). Springer New York.

Q

Quayle, D., Dziurawiec, S., Roberts, C., Kane, R., & Ebsworthy, G. (2001). The effect of an optimism and lifeskills program on depressive symptoms in preadolescence. *Behaviour Change*, *18,* 194– 203.

R

Raes, F., Griffith, J. W., Van der Gucht, K., & Williams, J. M. G. (2014). School-based prevention and reduction of depression in adolescents: A cluster-randomized controlled trial of a mindfulness group program. *Mindfulness*, *5*, 477-486.

Ramos-Olazagasti, M. A., Shrout, P. E., Yoshikawa, H., Canino, G. J., & Bird, H. R. (2013). Contextual risk and promotive processes in Puerto Rican youths' internalizing trajectories in Puerto Rico and New York. *Development and Psychopathology*, *25*, 755-771.

Restifo, K., & Bögels, S. (2009). Family processes in the development of youth depression: Translating the evidence to treatment. *Clinical Psychology Review*, *29*, 294-316.

Reupert, A. E., Cuff, R., Drost, L., Foster, K., Van Doesum, K. T., & van Santvoort, F. (2013). Intervention programs for children whose parents have a mental illness: a review. *The Medical Journal of Australia*, *199*, 18-22.

Rice, F., Harold, G., & Thapar, A. (2002). The genetic aetiology of childhood depression: a review. *Journal of Child Psychology and Psychiatry*, *43*, 65-79.

Rieffe, C., Oosterveld, P., Terwogt, M. M., Novin, S., Nasiri, H., & Latifian, M. (2010). Relationship between alexithymia, mood and internalizing symptoms in children and young adolescents: Evidence from an Iranian sample. *Personality and Individual Differences*, *48*, 425-430.

Ringwalt, C. L., Ennett, S., Johnson, R., Rohrbach, L. A., Simons-Rudolph, A., Vincus, A., & Thorne, J. (2003). Factors associated with fidelity to substance use prevention curriculum guides in the nation's middle schools. *Health Education & Behavior*, *30*, 375-391.

Roberts, C. M., Kane, R., Bishop, B., Cross, D., Fenton, J., & Hart, B. (2010). The prevention of anxiety and depression in children from disadvantaged schools. *Behaviour Research and Therapy*, *48*, 68-73.

Roberts, C., Kane, R., Thomson, H., Bishop, B., & Hart, B. (2003). The prevention of depressive symptoms in rural school children: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, *71*, 622–628.

Romens, S. E., Abramson, L. Y., & Alloy, L. B. (2009). High and low cognitive risk for depression: Stability from late adolescence to early adulthood. *Cognitive Therapy and Research*, *33*, 480-498.

Rudolph, K. D., & Hammen, C. (1999). Age and gender as determinants of stress exposure, generation, and reactions in youngsters: A transactional perspective. *Child Development*, *70*, 660-677.

Rudolph, K. D., Hammen, C., Burge, D., Lindberg, N., Herzberg, D., & Daley, S. E. (2000). Toward an interpersonal life-stress model of depression: The developmental context of stress generation. *Development and Psychopathology*, *12*, 215-234.

Rueter, M. A., Scaramella, L., Wallace, L. E., & Conger, R. D. (1999). First onset of depressive or anxiety disorders predicted by the longitudinal course of internalizing symptoms and parent-adolescent disagreements. *Archives of General Psychiatry*, *56*, 726-732.

Ruiter, M. (1997). Preventie van depressie bij jongeren, probleemanalyse, ontwikkeling en evaluatie van de cursus "stemmingmakerij" [Prevention of depression in adolescents, problem analysis, development and evaluation of the course "stemmingmakerij"]. Maastricht: Unigraphic, Universiteit Maastricht.

S

Sameroff, A. J., & Mackenzie, M. J. (2003). Research strategies for capturing transactional models of development: The limit of the possible. *Development and Psychopathology, 15*, 581-612.

Sanchez-Villegas, A., Schlatter, J., Ortuno, F., Lahortiga, F., Pla, J., Benito, S., & Martinez-Gonzalez, M. A. (2008). Validity of a self-reported diagnosis of depression among participants in a cohort study using the Structured Clinical Interview for DSM-IV (SCID-I). *BMC Psychiatry*, *8*, 43.

Sawyer, M. G., Harchak, T. F., Spence, S. H., Bond, L., Graetz, B., Kay, D., ... & Sheffield, J. (2010). School-based prevention of depression: A 2-year follow-up of a randomized controlled trial of the beyondblue schools research initiative. *Journal of Adolescent Health*, *47*, 297-304.

Saxena, S., Jané-Llopis, E., & Hosman, C. (2006). Prevention of mental and behavioural disorders: implications for policy and practice. *World Psychiatry*, *5*, 5-14.

Saylor, C. F., Finch, A. J., Spirito, A., & Bennett, B. (1984). The Children's Depression Inventory: A systematic evaluation of psychometric properties. *Journal of Consulting and Clinical Psychology, 52*, 955–967.

Seligman, M. E. P. (1978). Comment and integration. *Journal of Abnormal Psychology, 87*, 165-179.

Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. *BMC medicine*, *8*, 18.

Schuck, K., Bricker, J. B., Otten, R., Kleinjan, M., Brandon, T. H., & Engels, R. C. M. E. (2014). Effectiveness of proactive quitline counseling for smoking parents recruited through primary schools: Results of a randomized controlled trial. *Addiction*, *109*, 830-841.

Schrier, A. C., de Wit, M. A., Rijmen, F., Tuinebreijer, W. C., Verhoeff, A. P., Kupka, R. W., ... & Beekman, A. T. (2010). Similarity in depressive symptom profile in a population-based study of migrants in the Netherlands. *Social Psychiatry and Psychiatric Epidemiology*, *45*, 941-951.

Shih, J. H., Eberhart, N. K., Hammen, C. L., & Brennan, P. A. (2006). Differential exposure and reactivity to interpersonal stress predict sex differences in adolescent depression. *Journal of Clinical Child and Adolescent Psychology*, *35*, 103-115.

Shochet, I. M., Dadds, M. R., Holland, D., Whitefield, K., Harnett, P. H., & Osgarby, S. M. (2001). The efficacy of a universal school-based program to prevent adolescent depression. *Journal of Clinical Child Psychology*, *30*, 303-315.

Shochet, I., Montague, R., Smith, C., & Dadds, M. (2014). A Qualitative Investigation of Adolescents' Perceived Mechanisms of Change from a Universal School-Based Depression Prevention Program. *International Journal of Environmental Research and Public Health*, *11*, 5541-5554.

Shrout, P. E., Link, B. G., Dohrenwend, B. P., Skodol, A. E., Stueve, A., & Mirotznik, J. (1989). Characterizing life events as risk factors for depression: The role of fateful loss events. *Journal of Abnormal Psychology*, *98*, 460–467.

Siegel, J. M., Aneshensel, C. S., Taub, B., Cantwell, D. P., & Driscoll, A. K. (1998). Adolescent depressed mood in a multiethnic sample. *Journal of Youth and Adolescence*, *27*, 413-427.

Sifneos, P. E. (1996). Alexithymia: past and present. *The American Journal of Psychiatry*, *153*, 137-142.

Silk, J. S., Steinberg, L., & Morris, A. S. (2003). Adolescents' emotion regulation in daily life: Links to depressive symptoms and problem behavior. *Child Development*, *74,* 1869-1880.

Silverstone, P. H., Bercov, M., Suen, V. Y., Allen, A., Cribben, I., Goodrick, J., ... & McCabe, C. (2015). Initial findings from a novel school-based program, EMPATHY, which may help reduce depression and suicidality in youth. *Plos One, 10*, e0125527.

Simons, A. D., Angell, K. L., Monroe, S. M., & Thase, M. E. (1993). Cognition and life stress in depression: Cognitive factors and the definition, rating, and generation of negative life events. *Journal of Abnormal Psychology, 102,* 584–591.

Slavin, L. A., & Rainer, K. L. (1990). Gender differences in emotional support and depressive symptoms among adolescents: A prospective analysis. *American Journal of Community Psychology*, *18*, 407-421.

Smit, F., Cuijpers, P., Oostenbrink, J., Batelaan, N., De Graaf, R., & Beekman, A. (2006). Costs of nine common mental disorders: implications for curative and preventive psychiatry. *Journal of Mental Health Policy and Economics, 9*, 193-200.

Smit, F., Vlasveld, M., Beekman, A., Cuijpers, P., Schoevers, R., Ruiter, M., & Boon, B. (2013). Depressie preventie. Stand van zaken, nieuwe richtingen [Depression prevention. Current situation, new directions]. Utrecht: Trimbos-instituut.

Smith, J. D., Schneider, B. H., Smith, P. K., & Ananiadou, K. (2004). The effectiveness of whole-school antibullying programs: A synthesis of evaluation research. *School Psychology Review*, *33*, 547-560.

Sobocki, P., Jönsson, B., Angst, J., & Rehnberg, C. (2006). Cost of depression in Europe. *Journal of Mental Health Policy and Economics*, *9*, 87-98.

Solantaus, T., Paavonen, E. J., Toikka, S., & Punamäki, R. L. (2010). Preventive interventions in families with parental depression: children's psychosocial symptoms and prosocial behaviour. *European Child & Adolescent Psychiatry*, *19*, 883-892.

Southall, D., and Roberts, J. E. (2002). Attributional style and selfesteem in vulnerability to adolescent depressive symptoms following life stress: A 14-week prospective study. Cognitive Therapy and Research 26: 563–579.

Sowden, A. J., & Stead, L. F. (2003). Community interventions for preventing smoking in young people. *Cochrane Database of Systematic Reviews*, *1*.

Sowislo, J. F., & Orth, U. (2013). Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. *Psychological Bulletin*, *139*, 213-240.

Spek, V., Nyklíček, I., Cuijpers, P., & Pop, V. (2008). Alexithymia and cognitive behaviour therapy outcome for subthreshold depression. *Acta Psychiatrica Scandinavica*, *118*, 164-167.

Spence, S. H., Sawyer, M. G., Sheffield, J., Patton, G., Bond, L., Graetz, B., & Kay, D. (2014). Does the absence of a supportive family environment influence the outcome of universal intervention for the prevention of depression?. *International Journal of Environmental Research and Public Health*, *11*, 5113-5132.

Spence, S. H., Sheffield, J. K., & Donovan, C. L. (2003). Preventing adolescent depression: an evaluation of the problem solving for life program. *Journal of consulting and Clinical Psychology*, *71*, 3.

Spence, S. H., Sheffield, J. K., & Donovan, C. L. (2005). Long-term outcome of a school-based, universal approach to prevention of depression in adolescents. *Journal of Consulting and Clinical Psychology*, *73*, 160-167.

Spence, S. H., & Shortt, A. L. (2007). Research Review: Can we justify the widespread dissemination of universal, school-based interventions for the prevention of depression among children and adolescents? *Journal of Child Psychology and Psychiatry*, *48*, 526-542.

Spielmans, G. I., Pasek, L. F., & McFall, J. P. (2007). What are the active ingredients in cognitive and behavioral psychotherapy for anxious and depressed children? A meta-analytic review. *Clinical Psychology Review, 27,* 642-654.

Spijker, J., Bockting, C., Meeuwissen, J. A., van Vliet, I. M., Emmelkamp, P. M. G., Hermens, M. L. M., & van Balkom, A. J. L. M. (2013). *Multidisciplinaire richtlijn depressie (Derde revisie): Richtlijn voor de diagnostiek, behandeling en begeleiding van volwassen patiënten met een depressieve stoornis [Multidisciplinary guideline depression (third revision): Guideline for diagnostics, treatment and counselling of adults with a depressive disorder].* Utrecht: Trimbos-Instituut.

Spijkerman, R., Roek, M. A., Vermulst, A., Lemmers, L., Huiberts, A., & Engels, R. C. M. E. (2010). Effectiveness of a web-based brief alcohol intervention and added value of normative feedback in reducing underage drinking: a randomized controlled trial. *Journal of Medical Internet Research*, *12,* e65.

Statline, 2015. Retrieved from: http://statline.cbs.nl/Statweb/publication/?VW=T&DM= SLNL&PA =83096NED&D1= 185,188,195-201,204,207,210,213&D2= 0,3-6&D3=a&D4 =l&HD=150819-1831&HDR= T&STB=G1,G2,G3

Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences*, *9*, 69-74.

Stewart, S. M., Kennard, B. D., Lee, P. W., Hughes, C. W., Mayes, T. L., Emslie, G. J., & Lewinsohn, P. M. (2004). A cross-cultural investigation of cognitions and depressive symptoms in adolescents. *Journal of Abnormal Psychology, 113*, 248-257.

Stice, E., Ragan, J., & Randall, P. (2004). Prospective relations between social support and depression: Differential direction of effects for parent and peer support? *Journal of Abnormal psychology*, *113*, 155-159.

Stice, E., Rohde, P., Seeley, J. R., & Gau, J. M. (2010). Testing mediators of intervention effects in randomized controlled trials: An evaluation of three depression prevention programs. *Journal of Consulting and Clinical Psychology*, *78*, 273-280.

Stice, E., Shaw, H., Bohon, C., Marti, C. N., & Rohde, P. (2009). A meta-analytic review of depression prevention programs for children and adolescents: Factors that predict magnitude of intervention effects. *Journal of Consulting and Clinical Psychology*, *77*, 486-503.

Stice, E., Shaw, H., & Marti, C. N. (2006). A meta-analytic review of obesity prevention programs for children and adolescents: the skinny on interventions that work. *Psychological Bulletin*, *132*, 667-691.

Stuurgroep Multidisciplinaire Richtlijnontwikkeling GGZ (2009). *Richtlijn addendum depressie bij deugd [Guideline addendum depression in Youth].* Utrecht: Trimbos-instituut.

Sullivan, P. F., Neale, M. C., & Kendler, K. S. (2000). Genetic epidemiology of major depression: review and meta-analysis. *American Journal of Psychiatry, 157, 1552–1562.*

T

Tak, Y. R., Kleinjan, M., Lichtwarck-Aschoff, A., & Engels, R. C. (2014). Secondary outcomes of a school-based universal resiliency training for adolescents: a cluster randomized controlled trial. *BMC Public Health*, *14*, 1171.

Tak, Y. R., Lichtwarck-Aschoff, A., Gillham, J. E., Van Zundert R. M. P., & Engels R. C. M. E. (2015). Universal school-based depression prevention Op Volle Kracht: A longitudinal Cluster Randomized Controlled Trial. *Journal of Abnormal Child Psychology*. In Press.

Tak, Y. R., Zundert R. M. van, Kuijpers R. C., Vlokhoven B. S. van, Rensink H. F. W., & Engels R. C. M. E. (2012). A randomized controlled trial testing the effectiveness of a universal school-based depression prevention program 'Op Volle Kracht' in the Netherlands. *BMC Public Health, 12,* 21.

Thapar, A., Collishaw, S., Pine, D. S., & Thapar, A. K. (2012). Depression in adolescence. *The Lancet*, *379*, 1056-1067.

Timbremont, B., & Braet, C. (2004). Cognitive vulnerability in remitted depressed children and adolescents. *Behaviour Research and Therapy, 42*, 423-437.

Timbremont, B., & Braet, C. (2006). Brief report: A longitudinal investigation of the relation between a negative cognitive triad and depressive symptoms in youth. *Journal of Adolescence, 29,* 453–458.

Timbremont, B., Braet, C. & Dreessen, L. (2004). Assessing depression in youth: relation between the children's depression inventory and a structured interview. *Journal of Clinical Child and Adolescent Psychology, 33*, 149–157.

Timbremont, B., Braet, C., Roelofs, J. (2008). *Children's Depression Inventory: Handleiding [Children's Depression Inventory: Manual].* Amsterdam: Pearson.

Ttofi, M. M., & Farrington, D. P. (2011). Effectiveness of school-based programs to reduce bullying: A systematic and meta-analytic review. *Journal of Experimental Criminology, 7*, 27-56.

Twenge, J. M., & Nolen-Hoeksema, S. (2002). Age, gender, race, socioeconomic status, and birth cohort differences on the Children's Depression Inventory: A meta-analysis. *Journal of Abnormal Psychology, 111*, 578–588.

U

Uher, R., & McGuffin, P. (2010). The moderation by the serotonin transporter gene of environmental adversity in the etiology of depression: 2009 update. *Molecular Psychiatry, 15*, 18-22.

V

Van Daal, H.J., Sönmez, N., Brugman, M. (2003). *Speuren naar interculturele kwaliteit voor de GGZ. Perspectieven voor betere kwaliteit van zorg voor vluchtelingen en migranten [Looking for intercultural quality for the mental health care. Perspectives for better quality of care for refugees and migrants].* Utrecht: Verwey-Jonker Instituut.

Van der Zanden, R., Kramer, J., Gerrits, R., & Cuijpers, P. (2012). Effectiveness of an online group course for depression in adolescents and young adults: a randomized trial. *Journal of medical Internet research, 14*, e86.

Van der Zanden, R., & Linden, D. van der (2013). *Evaluatieonderzoek Happyles Den Haag. Implementatie van Happyles in het VMBO en de Jeugdzorgketen ter bevordering van de mentale veerkracht van jongeren [Evaluative research of Happyles The Hague. Implementation of Happyles in highschool and youthcare to promote mental resiliency in youth].*Utrecht: Trimbos-Instituut.

Van Ingen, D. J., Freiheit, S. R., & Vye, C. S. (2009). From the lab to the clinic: Effectiveness of cognitive-behavioral treatments for anxiety disorders. *Professional Psychology: Research and Practice*, *40*, 69-74.

Van Roekel, E., Goossens, L., Verhagen, M., Wouters, S., Engels, R. C. M. E., & Scholte, R. H. (2013). Loneliness, affect, and adolescents' appraisals of company: An experience sampling method study. *Journal of Research on Adolescence*, *24*, 350–363.

Van Santvoort, F., Hosman, C. M., Van Doesum, K. T., & Janssens, J. M. (2014). Effectiveness of preventive support groups for children of mentally ill or addicted parents: a randomized controlled trial. *European Child & Adolescent Psychiatry*, *23*, 473-484.

Vitiello, B. (2011). Prevention and treatment of child and adolescent depression: challenges and opportunities. *Epidemiology and Psychiatric Sciences, 20*, 37-43.

Vliek, L., Overbeek, G., & Orobio de Castro, B. (2014). "I want to behave prosocially and I can choose to do so": Effectiveness of TIGER (Kanjertraining) in 8-to 11-year-olds. *European Journal of Developmental Psychology*, *11*, 77-89.

Voogt, C., Kuntsche, E., Kleinjan, M., Poelen, E., & Engels, R. (2014). Using ecological momentary assessment to test the effectiveness of a web-based brief alcohol intervention over time among heavy-drinking students: randomized controlled trial. *Journal of Medical Internet Research*, *16*.

Voogt, C. V., Poelen, E. A., Kleinjan, M., Lemmers, L. A., & Engels, R. C. M. E. (2013). The effectiveness of the 'what do you drink'web-based brief alcohol intervention in reducing heavy drinking among students: a two-arm parallel group randomized controlled trial. *Alcohol and alcoholism*, *48*, 312-321.

W

Wagner, C., Abela, J. R., & Brozina, K. (2006). A comparison of stress measures in children and adolescents: A self-report checklist versus an objectively rated interview. *Journal of Psychopathology and Behavioral Assessment*, *28*, 250-260.

Wahl, M. S., Adelson, J. L., Patak, M. A., Pössel, P., & Hautzinger, M. (2014). Teachers or psychologists: who should facilitate depression prevention programs in schools?. *International journal of environmental research and public health*, *11*(5), 5294-5316.

Way, N., Reddy, R., & Rhodes, J. (2007). Students' perceptions of school climate during the middle school years: Associations with trajectories of psychological and behavioral adjustment. *American Journal of Community Psychology*, *40*, 194-213.

Webb, C. A., Auerbach, R. P., & DeRubeis, R. J. (2012). Processes of change in CBT of adolescent depression: Review and recommendations. *Journal of Clinical Child & Adolescent Psychology*, *41*, 654-665.

Weersing, V. R., & Weisz, J. R. (2002). Mechanisms of action in youth psychotherapy. *Journal of Child Psychology and Psychiatry*, *43*, 3-29.

Weissman, M. M., Bland, R. C., Canino, G. J., Greenwald, S., Hwu, H. G., Joyce, P. R., ... & Yeh, E. K. (1999). Prevalence of suicide ideation and suicide attempts in nine countries. *Psychological Medicine*, *29*, 9-17.

Weissman, M. M., Warner, V., Wickramaratne, P., Moreau, D., & Olfson, M. (1997). Offspring of depressed parents. 10 years later. *Archives of General Psychiatry, 54*, 932–940.

Weisz, J. R., McCarty, C. A., & Valeri, S. M. (2006). Effects of psychotherapy for depression in children and adolescents: a meta-analysis. *Psychological Bulletin*, *132*, 132.

Wiehe, S. E., Garrison, M. M., Christakis, D. A., Ebel, B. E., & Rivara, F. P. (2005). A systematic review of school-based smoking prevention trials with long-term follow-up. *Journal of Adolescent Health*, *36*, 162-169.

Wijnhoven, L. A., Creemers, D. H., Vermulst, A. A., Scholte, R. H., & Engels, R. C. M. E. (2014). Randomized controlled trial testing the effectiveness of a depression prevention program ('Op Volle Kracht') among adolescent girls with elevated depressive symptoms. *Journal of Abnormal Child Psychology*, *42*, 217-228.

Wyn, J., Cahill, H., Holdsworth, R., Rowling, L., & Carson, S. (2000). MindMatters, a whole-school approach promoting mental health and wellbeing. *Australian and New Zealand Journal of Psychiatry*, *34*, 594-601.

Y

Yaroslavsky, I., Pettit, J. W., Lewinsohn, P. M., Seeley, J. R., & Roberts, R. E. (2013). Heterogeneous trajectories of depressive symptoms: Adolescent predictors and adult outcomes. *Journal of Affective Disorders*, *148*, 391-399.

Yu, D. L., & Seligman, M. E. (2002). Preventing depressive symptoms in Chinese children. *Prevention & Treatment*, *5*, 9a.

Publications

Kindt, K. C. M., Kleinjan, M., Janssens, J. M. A. M., & Scholte, R. H. J. (2014). Evaluation of a school-based depression prevention program among adolescents from low-income areas: A randomized controlled effectiveness trial. *International Journal of Environmental Research and Public Health*, *11*, 5273-5293.

Kindt, K. C. M., Kleinjan, M., Janssens, J. M. A. M., & Scholte, R. H. J. (2015). Cross-Lagged Associations Between Adolescents' Depressive Symptoms and Negative Cognitive Style: The Role of Negative Life Events. *Journal of Youth and Adolescence*, 1-13.

Kindt, K. C. M., Kleinjan, M., Janssens, J. M. A. M., & Scholte, R. H. J. The Effect of a Depression Prevention Program on Negative Cognitive Style Trajectories in Early Adolescents. *Health Education Research* (resubmitted).

Kindt, K. C. M., Scholte, R. H. J., Schuck, K., Kleinjan, M., & Janssens, J. M. A. M (2015). Examining Reciprocal Associations Between a Negative Cognitive Style and Depressive Symptoms in Early Adolescence. *International Journal of Cognitive Therapy*, *8*, 78-94.

Kindt, K. C. M., van Zundert, R., & Engels, R. C. M. E. (2012). Evaluation of a Dutch school-based depression prevention program for youths in highrisk neighborhoods: study protocol of a two-armed randomized controlled trial. *BMC Public Health*, *12*, 212.

Nederlandse samenvatting

Een groot deel van de Nederlandse jongeren kampt met depressieve klachten. Het hebben van depressieve klachten in de adolescentie heeft negatieve gevolgen op zowel de korte als de lange termijn. Op de korte termijn hebben jongeren met depressieve klachten een grotere kans op eetproblemen, slechte prestaties op school, alcohol- en drugsgebruik, zelfmoordgedachten en zelfmoord. Op de lange termijn hebben jongeren met depressieve klachten meer kans op depressie in de volwassenheid, werkloosheid en relatieproblemen. Daarnaast brengt depressie hoge kosten voor de maatschappij met zich mee. Het ontwikkelen van een preventieprogramma voor jongeren dat hen helpt om depressieve klachten en alle nadelige gevolgen hiervan te voorkomen is dus wenselijk.

Op Volle Kracht (OVK) is een groepsgericht preventieprogramma dat ontwikkeld is om de toename van depressieve klachten bij jonge adolescenten te voorkomen. Het programma is gebaseerd op het Amerikaanse Penn Resiliency Program en is vertaald en aangepast voor Nederlandse jongeren. Met behulp van een werkboek met 16 hoofdstukken met gekleurde illustraties worden lees- en schrijfopdrachten, rollenspellen en discussies aangereikt. OVK is gebaseerd op cognitieve gedragstherapie, waarin gesteld wordt dat negatieve gevoelens uitgelokt worden door negatieve gedachten. Als iemand bijvoorbeeld na het verliezen van een voetbalwedstrijd denkt "ik ben een slechte voetballer, het ligt aan mij", zal hij zich als gevolg van die gedachte somber voelen. OVK begint dan ook met het vergroten van het inzicht van de jongere in zijn eigen gevoelens en gedachten, en laat de jongere zien hoe deze twee onderling verband houden. Daarna worden niet-helpende denkstijlen uitgelegd. Daarmee bedoelen we een terugkomend patroon van negatieve gedachten. Een voorbeeld van een niet-helpende denkstijl is de 'altijd-ik gedachte', waarbij een jongere bij vervelende gebeurtenissen de oorzaak van die gebeurtenis onterecht bij zichzelf legt. Tijdens OVK oefent de jongere deze niet-helpende denkstijlen te herkennen om vervolgens meer helpende, positieve gedachten te formuleren. In het geval van de verloren voetbalwedstrijd zou dat kunnen zijn: "Dat we verloren hebben komt door ons hele team en niet alleen door mij. Als we trainen maken we de volgende keer meer kans om te winnen". Als jongeren eenmaal geleerd hebben dat een meer positieve manier van denken tot meer positieve gevoelens leidt, wordt de koppeling met gedrag gelegd. Immers, als je je opgewekter voelt, ben je ook beter in staat om sociale contacten aan te gaan of om taken op te pakken. Vervolgens kunnen deze meer positieve gebeurtenissen op hun beurt weer meer positieve gedachten en gevoelens oproepen. Om het gedrag te versterken komen sociale vaardigheden en oplossingsvaardigheden in de tweede helft van het programma aan bod.

In dit proefschrift is getest of het programma OVK, gegeven door de docenten van jongeren op hun eigen school, werkt om depressieve klachten bij jongeren uit achterstandswijken te verminderen. Jongeren uit achterstandswijken zijn een kwetsbare groep

om depressieve klachten te ontwikkelen, mede omdat ze relatief veel negatieve levensgebeurtenissen meemaken. Daarnaast is in dit proefschrift onderzocht of een negatieve denkstijl voorafgaat aan depressieve klachten bij jongeren en wat de invloed van negatieve levensgebeurtenissen hierop is.

Na de introductie van de onderwerpen depressie, negatieve denkstijl en het programma Op Volle Kracht in hoofdstuk 1, wordt in het tweede hoofdstuk de voorgenomen opzet van de studie beschreven. Dit zogenaamde studieprotocol beschrijft onder andere dat 11 scholen betrokken worden in het onderzoek, met in totaal 1324 jongeren van 11 tot 14 jaar die in achterstandswijken wonen. De helft van de klassen krijgt het programma Op Volle Kracht, dat gegeven wordt door hun mentor tijdens de mentorlessen. De andere helft krijgt de gewone mentorlessen. Vragenlijsten over depressieve klachten, negatieve denkstijl en negatieve levensgebeurtenissen worden vooraf aan het programma afgenomen bij de leerlingen en vervolgens direct na het programma, en ook 6 en 12 maanden later.

In hoofdstuk 3 worden de bevindingen over de effectiviteit van het programma op depressieve klachten beschreven. Het wel of niet volgen van OVK gaf geen verschil in de mate van depressieve klachten die één jaar na de interventie gerapporteerd werden. Tegengesteld aan wat we verwacht hadden, bleken de jongeren uit de OVK-groep een jaar na de interventie zelfs vaker boven de grens van klinisch depressieve klachten te scoren dan de adolescenten uit de controlegroep. Verdere analyses wezen echter uit dat deze uitkomst mogelijk niet geheel stabiel is en bovendien was de groep met klinisch depressieve klachten klein. Er bleken ook jongeren te zijn die wel baat leken te hebben bij het programma. Jongeren met ouders met psychische klachten die OVK kregen, hadden minder depressieve klachten dan jongeren met ouders met psychische klachten die in de controlegroep zaten. Er waren geen verschillen wanneer we groepen vergeleken op basis van geslacht, etnische achtergrond of mate van depressieve klachten bij de start van het programma. Verder bleek de score van depressieve klachten bij de start van het programma dermate laag, dat het selecteren van adolescenten uit achterstandswijken vermoedelijk niet geresulteerd heeft in een hoog-risico groep zoals we hadden verwacht. In hoofdstuk 4 wordt het effect van OVK op de negatieve denkstijl bekeken. Aangezien OVK technieken bevat om adolescenten te stimuleren om op een meer realistische en positieve manier te denken, verwachtten we dat de groep die OVK kreeg lager zou scoren op de negatieve denkstijl dan de controle groep. Er bleek echter geen verschil te ontstaan tussen gemiddelde score op negatieve denkstijl in de OVK-groep en de controlegroep. Vervolgens keken we of er onder jongeren subgroepen bestonden die verschillen in hun ontwikkeling van een negatieve denkstijl. Er konden vier groepen onderscheiden worden. Ten eerste was er een groep jongeren met een stabiel lage denkstijl, wat betekent dat zij gedurende het onderzoek niet tot nauwelijks negatief dachten. Ten tweede was er een groep jongeren die tijdens de studie steeds meer negatief ging denken en ten derde was er een groep die tijdens de studie steeds minder negatief ging denken. Tenslotte was er

een groep die gedurende het onderzoek op alle momenten aangaf negatief te denken. Of de jongere in de OVK-groep of de controlegroep zat was echter niet voorspellend voor hoe de negatieve denkstijl ontwikkelde.

In de hoofdstukken 5 en 6 wordt gekeken hoe een negatieve denkstijl en depressieve klachten voorspellend waren voor elkaars ontwikkeling. Dit wordt bekeken los van het depressie preventieprogramma OVK. Voor deze onderzoeksvragen werden de datasets van twee verschillende onderzoeken gebruikt. In hoofdstuk 5 werd een dataset gebruikt van jongeren van reguliere middelbare scholen en kwam naar voren dat het hebben van een negatieve denkstijl voorspellend was voor het ervaren van meer depressieve klachten zes maanden later. Andersom bestond dit verband niet; depressieve klachten waren dus niet voorspellend voor een meer negatieve denkstijl. Er was geen verschil tussen jongens en meisjes. Deze bevindingen bevestigen de verwachting dat een negatieve denkstijl voorafgaat aan depressieve klachten en sluit dus aan bij een depressie preventiemethode als OVK.

Tot slot gebruikten we in hoofdstuk 6 de dataset van de jongeren uit de achterstandswijken. Tegengesteld aan wat gevonden werd in hoofdstuk 5, voorspelden depressieve klachten de negatieve denkstijl zes maanden later, en bestond het verband andersom nu niet. We verwachtten dat dit verschil deels te verklaren is door twee verschillende vragenlijsten die gebruikt zijn om de negatieve denkstijl te meten. Aanvullend bekeken we de rol van de mate van negatieve levensgebeurtenissen. Als we rekening hielden met de invloed van negatieve levensgebeurtenissen, bleek het verband tussen een negatieve denkstijl en depressieve klachten te verdwijnen. Als gevolg hiervan concluderen we dat de gevonden verschillen tussen hoofdstuk 5 en 6 vermoedelijk toe te wijzen zijn aan de invloed van negatieve levensgebeurtenissen.

Conclusies

Het programma OVK lijkt geen effectieve depressie preventiemethode bij jongeren van het middelbaar onderwijs in achterstandswijken. Ook is het programma niet effectief bevonden om een negatieve denkstijl naar een meer positieve denkstijl om te zetten. We raden daarom af om OVK in zijn huidige vorm te implementeren in het regulier voortgezet onderwijs bij jongeren zonder verhoogd risico op depressieve klachten. De mate van depressieve klachten van onze doelgroep (jongeren uit achterstandswijken) was niet hoger of lager dan de mate van klachten van een gemiddelde groep adolescenten in deze levensfase. Daarom kunnen we in ons onderzoek niet spreken van een kwetsbare doelgroep, ondanks dat dit vooraf wel onze verwachting was. Het uitblijven van het effect van OVK kunnen we dan ook niet generaliseren naar selectieve doelgroepen waarin jongeren wel een verhoogd risico op depressieve klachten hebben. Zo hebben we aanwijzingen dat OVK wel een preventief effect geeft bij de selectieve doelgroep van

jongeren van ouders met psychische klachten. Verder onderzoek bij die doelgroep zou dus nuttig zijn.

Het OVK programma is gebaseerd op de cognitieve gedragstherapie en de aanname dat de ontwikkeling van een negatieve denkstijl voorafgaat aan de ontwikkeling van depressieve klachten. Deze aanname werd echter niet bevestigd over de twee jaar tijd dat wij gemeten hebben. Een negatieve cognitieve stijl bleek niet eenduidig voorspellend voor depressieve klachten. Er bleek zelfs helemaal geen voorspellend verband te bestaan als we rekening hielden met de meegemaakte negatieve levensgebeurtenissen van de jongeren. In de toekomst zouden we ons dus meer kritisch moeten opstellen naar de algemeen aanvaarde veronderstelling dat het veranderen van denkstijlen van invloed is op het ontwikkelen van depressieve klachten bij jongeren. Daarbij zouden we bij de opzet van toekomstige depressie preventieprogramma's breder moeten denken dan het inzetten op het veranderen van een negatieve denkstijl.

Dankwoord

Beste Jan. Mijn geschiedenis met jou begon in 2009 toen je me met open armen hebt ontvangen als docent op de vakgroep. Nog voor ik het contract getekend had, polste je al of ik misschien mee zou willen op een trip naar Philadelphia voor een depressie preventie project...… Dat dit project later zou uitmonden in een promotietraject met jou als mijn promotor had ik toen niet durven dromen. Je begon ongeveer tegelijk aan je pensioen als aan het promotorschap van mijn project, en je was er zeker nog scherp genoeg voor. Dank je wel voor je kritische en nuchtere opmerkingen – meestal met pen in je opa-handschrift, en soms toch met een digitale poging. Ik waardeer je kennis waarmee je me mee naar de basis van de statistiek toe nam en hoe je me in discussies scherp hield door mij te wijzen op belangrijke details in artikelen die ik je nota bene zelf toegestuurd had. Terugkomend was de opmerking dat het woordje 'a' miste voor constructen. Daar is in al die jaren niks aan veranderd. Misschien leer ik het ooit? Je stimuleerde me om het tempo in het schrijven te houden en gaf me vertrouwen dat artikelen van voldoende kwaliteit waren om in te dienen. Mede daardoor ligt er nu een proefschrift waar ik trots op ben. Bedankt, Jan!

Ron, ik vond het heel fijn dat jij de begeleiding op je wilde nemen toen Rinka vertrok. En gelukkig bleef je me ook begeleiden toen je het veel drukker kreeg na je overstap naar Praktikon en je nieuwe functie als bijzonder hoogleraar. Je opgewektheid, -plagerige-humor en positivisme werken aanstekelijk en daar werk ik graag mee samen! De maandelijkse discussies aan de door jou zelfgemaakte tafel waren niet alleen gezellig, maar ook uitdagend, kritisch en prikkelend. Zo wees je me regelmatig op de rode lijn van het artikel waar ik soms iets teveel van afweek. Of je wees me op het feit dat ik mijn redenering niet helemaal afmaakte en er een concluderende zin nodig was om de lezer mee te nemen. Het maakte de artikelen uiteindelijk sterker en beter. Daarnaast hebben we ook buiten het werk mooie, gezellige avonden meegemaakt. Dank je wel voor alles!

Marloes. Je bent mijn steun en toeverlaat geweest. Je was op elk moment weer bereikbaar als ik met vragen zat, ook toen je eenmaal bij het Trimbos-instituut werkte. Je rustige en nauwgezette werkstijl was steeds een verademing als de gedachtekronkels in mijn hoofd onoverzichtelijk werden. Ik vind je kennis van analysemethoden indrukwekkend, en vooral je vermogen om dit aan mij uit te leggen alsof het simpel is. Ik ging elke keer weer met veel plezier de uitdaging aan om zelf de nieuwe analyses eigen te maken. Daarnaast was je ook mijn taaltovenaar. Als ik met al mijn inzet een stukje kromme Engelse tekst geproduceerd had, wist jij met een paar tips de tekst op te poetsen tot hij glom van pracht en diepgang. Door de jaren heen heb ik daar heel veel van geleerd en steeds meer plezier gekregen in het schrijven. Dank je daarvoor!

Rinka, ooit heb ik dit project met jou als werkbegeleider mogen starten. Je bevlogenheid, gedrevenheid en enthousiasme zijn uitzonderlijk en inspirerend. Toch heb je de wetenschap en het project tussentijds verlaten. Hopelijk heb ik je niet tot wanhoop gedreven en daarmee een aandeel gehad in die keuze. Inmiddels ga jij je droom achterna! Ik bewonder je eigenheid en kracht. Je bent een kleurrijk mens met wie ik graag rondjes bij de IJzeren Man blijf lopen.

Natuurlijk wil ik ook de scholen, de mentoren en leerlingen bedanken die aan het onderzoek hebben meegewerkt. Zonder jullie was het nooit gelukt!

Carmen, van gezellig kletsen als onbekenden in de pantry tot samen de Batavierenrace organiseren. Lange tijd zaten we samen in het promotieschuitje, waar je voor mij toch een beetje een voorbeeld-aio was. Ooit was ik nog jouw paranimf, nu jij de mijne! Bedankt! We blijven kaasfonduen.

Marijke, wat begon met een warm ontvangst op de uni door jou als buuf en collega-docent, is uitgegroeid tot een mooie vriendschap. Uiteindelijk hebben we nog nooit een pubquiz met de mannen gedaan, maar misschien wel op naar meer karaoke?

Sanne, roomie! Bedankt dat ik met jou de frustraties kon delen hoe het is om als buiten-promovenda te moeten ploeteren in het universitaire apparaat. Samen op congres naar Miami was de kers op de taart. Succes met jouw laatste loodjes!

Rowella, ik kan op zoveel mooie momenten met jou terugblikken! Van hotelkamers tot een lek luchtbed, van +30 tot -30 °C, van Landal Greenpark tot hondensleeën in Rocky mountains; ik krijg spontaan heimwee naar een gezamenlijk project met jou. Bedankt voor al die mooie momenten!

Daan, mijn wederhelft in ons presentatie-dreamteam. Ik ga je vrolijke hoofd en te slechte grappen missen. Bedankt voor de leuke tijd.

Karin, al hebben we op het werk weinig met elkaar te maken gehad, ik blijf graag met je borrelen!

Cilia, bedankt voor je ondersteuning als leidinggevende in de afgelopen jaren.
Collega's Maartje, Maaike, Maartje, Mélou, Marleen, Gerine, Roel, Roy, Thao, Kathrin, Yuli, Renske, Adam, Lisanne, Suzanne, Manon, Denise, Hannah, Isabel, Lonneke, Katja en Diana; bedankt allemaal voor de fijne tijd op de 6e.

Boukje en Hettie. De training in het PRP-programma en het verkennen van Philadelphia was zonder jullie niet hetzelfde geweest. Bedankt voor de fijne samenwerking met het vertalen, piloten, en ontwikkelen van Op Volle Kracht!

Jolanda, ik werkte nog geen jaar bij het EZ toen ik aan jou de mogelijkheid voorlegde om promotieonderzoek te gaan doen. Je moest lachen, omdat je aan alles hoorde dat ik het toch wel zou gaan doen. Bedankt voor de flexibiliteit zodat ik die kans aan kon grijpen én afmaken, en ook om me daarnaast nog steeds professioneel verder te blijven ontwikkelen.

Lieve Borrelclub: Ollie, Barrie, Rikkie. Een gouden team, volop gezelligheid, geplaag, geouwehoer en soms ook een soort van casuistiek besprekingen (?). Sorry dat ik zo weinig koffie drink. Misschien moeten we gewoon vaker borrelen? Ook alle andere EZ-collega's, bedankt voor de fijne samenwerking en gezellige lunchpauzes in de afgelopen jaren. Speciale dank voor jou Sjoukje, voor die keren dat mijn agenda last minute weer eens veranderde. En Marjan, wij als dr.'s gaan een succes maken van TTZ!

Neel en Emm. Fysiek niet meer zo dichtbij als ooit op huis, maar ook op enige afstand zijn jullie mijn steun en toeverlaat. De weekendjes boerenbridge en yahtzee zijn onvervangbaar. Samen hobbels over en successen vieren! Bedankt dat jullie mijn vriendinnen zijn.

Deb en Wen. De basis is 20 jaar geleden gelegd en daar bouwen we nog steeds op voort. Of het nou wateractiviteiten of boswandelingen zijn, mijn verjaardag vier ik met jullie!

Imke, van dispuutgenoot, naar buurvrouw in Den Bosch, en inmiddels na een omweg mijn wandelmaatje. Van biertjes naar thee drinken, het leven is mooi. Bedankt voor de reflecterende gesprekken en gezellige momenten.

Maud, Noor, Kristie, Pauline, Mariken, bedankt voor alle fijne vriendschapsmomentjes in de afgelopen jaren.

Pap en mam. Dit proefschrift zou er niet gekomen zijn zonder eigenschappen die ik van jullie heb: De Zeeuwse nuchterheid van mam, de kritische houding van pap en een behoorlijke portie arbeidsethos en werktempo van jullie beiden. Bedankt voor alle ondersteuning die jullie ook elke keer geven als ik weer verhuis of als er geklust moet worden. En uiteraard voor de serene Koewachtse werkweken waarin belangrijke delen van het proefschrift geschreven zijn!

Sis, elk ons eigen leven en op zijn tijd samen gezelligheid. Leuk zijn die momenten waarin we zien dat we toch behoorlijk veel op elkaar lijken! Zeker als er bijzondere life events zijn weten we elkaar te vinden. Bedankt!

Iris en Sophie, mijn lieve huisgenootjes, maar toch een beetje meer dan dat! Bijzonder dat ik op deze wijze deel uit mag maken van jullie leven. Jullie beleving van de wereld verrijkt me keer op keer. Iris, speciaal bedankt voor alle stylingadviezen voor deze bijzondere dag. En Sophie, bedankt dat je mijn paranimf bent. Wie weet sta jij hier ooit ook….

Lieve Rutger, wat een mooie wending in het leven dat onze wegen elkaar kruisten en dat we gekozen hebben om bij elkaar op de weg in te voegen en samen verder te gaan. Mijn geluk met jou is wetenschappelijk niet te onderbouwen en dat is nu ook eens niet nodig! Bedankt voor alles wat je me brengt.

Juliet, je leven nog een ongeschreven blad. Ik kijk uit naar wat komen gaat!

Curriculum Vitae

Karlijn Kindt was born on October 22nd, 1983 in Axel, the Netherlands. After finishing secondary education cum laude at the Reynaertcollege in Hulst, she started the study Psychology at Tilburg University. In 2006, she graduated bene meritum from the Master Clinical Child Psychology. She started her working career as therapist at Amarant, an institute for people with intellectual disabilities. After a year, in 2007, she continued her work in a youth team of VGG-zorg, an outpatient mental health facility where she received her post-graduate clinical degree as a registered mental health care psychologist (GZ-psycholoog) in 2010. Parallel to her clinical work, she started teaching at the Radboud University Nijmegen in 2009 at the department of Educational Science (Pedagogische Wetenschappen en Onderwijskunde). Her main focus as a teacher was on diagnostic decision making and supervising students during their clinical internships.

In 2010, she became involved in the translation and adaptation of the depression prevention program Penn Resiliency Project into a Dutch version, named 'Op Volle Kracht'. She started her ZonMw-funded PhD-project concerning the evaluation of this prevention program in 2011. During her PhD-project, she supervised master thesis students and developed and coordinated the Master course 'Resilience: Practice and Research', which was directly related to her PhD-project on depression prevention. In 2013, she received the University Teaching Qualification (BKO). As a PhD-candidate, Karlijn developed and gave training modules on depression prevention techniques, both in national and international settings. She also participated in several national and international conferences. For instance, she organized and chaired a symposium on depression prevention at the Anxiety and Depression Association of America (ADAA) conference in Miami in 2014.

Since 2010, parallel to her PhD-project, she has continued her clinical work with children and youth at the division of Medical Psychology in St. Elisabeth hospital in Tilburg. She supervises students and junior psychologists. Her work focuses primarily on children with type 1 diabetes mellitus and adolescents with persistent medically unexplained symptoms (SOLK), for which she works in close collaboration with pediatricians. In 2015, as a part of the by ZonMw-funded Trauma TopCare project, she expanded the focus of her clinical work to the diagnostics and treatment of psychological consequences of traumatic injuries, such as anxiety, depression and post-traumatic stress disorder (PTSD). She took several courses that are related to her clinical work. For example, she became a certified mindfulness trainer and she completed the advanced course in Eye Movement Desentisation and Reprocessing (EMDR).

Currently, Karlijn still works as a mental health care psychologist at the St. Elisabeth-Twee Steden hospital in Tilburg and has the ambition to combine research and teaching with her clinical work.

Behavioural
Science
Institute

Radboud University